



COMDTNOTE 10360
24 NOV 2003

COMMANDANT NOTICE 10360

CANCELLED 23 NOV 2004

Subj: CH-2 TO THE COATINGS AND COLOR MANUAL, COMDTINST M10360.3B

1. PURPOSE. This Notice publishes changes to the Coast Guard Coatings and Color Manual, COMDTINST M10360.3B.
2. ACTION. Area and district commanders, commanders of maintenance and logistics commands, commanding officers of headquarters units, assistant commandants for directorates, Chief Counsel, and special staff offices at Headquarters shall comply with the provisions of this Notice. Internet release authorized.
3. DIRECTIVES AFFECTED. None
4. SUMMARY OF CHANGES. Changes to ref a, which are denoted by 'bold' type, include:

a. Chapter 1:

Revised to include guidance on the Manual change process, feedback via the Naval Engineering Forum website, and points of contact for coatings guidance.

b. Chapter 4:

Added Table 4-3, Coatings Preservation QA Checklist.

c. Chapter 6:

Revised Table 6-1, Compatibility of Commonly Used Paint Vehicles.

d. Chapter 7:

Revised Table 7-1, Roller Selection Guide.

DISTRIBUTION – SDL No. 140

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A	2	2	2		2	2	2		1	1		1	2	2	1	1	1		1		2					
B		8	20*	1	5	31		5	5	2	2	2	2	1	1	2		5	1		2	1				
C	1	1		5	1	3	3		1		5						1	2	1			1	1	5		
D	1	1	1	1				1				1*	1					1		1		1				1
E								1						1	1											
F																										
G			1																							
H																										

NON-STANDARD DISTRIBUTION: *B:c MLCs (6 extra); *D:l SWOSCOLCOM, ATG Mayport (3 extra), ATG Norfolk (3 extra), ATG San Diego (3 extra), ATG Pearl Harbor (3 extra), TAFT Roosevelt Roads only

e. Chapter 10:

Corrected Figure 10-1, Compartment Bulls-Eye.

f. Chapter 11:

Clarified the color change to “pure white” made by CH-1, allowed 41 UTBs w/paint removed to remain unpainted, provided the underwater body paint scheme for red hull vessels, extended the requirement for bare aluminum decks with slip resistant sheets to include UTBs and MLBs, and removed intumescent coatings for interior bulkheads.

g. Appendix A:

Re-write of polysiloxane system requirements (no longer epoxy polysiloxane) to allow for new candidates, added epoxy primer and midcoat options to polysiloxane systems, and provided new options for application and authorization of coarse slip resistant sheet material for all cutters and boats.

h. Appendix B:

Clarification on the use of Bilge Epoxy Coating Systems, use of inorganic zinc for interior space decks that are abused like cargo holds, and no paint option for aluminum hull boats in fresh water

i. Appendix C:

Updates list of CG approved coatings/materials and contact information for associated vendors.

5. PROCEDURE.

a. Remove and insert the following

(1) Table of Contents

(2) Chapters 1, 4, 5 and 11

(3) Pages 6-5 and 6-6, 7-7 and 7-8, 9-3 and 9-4, 10-5 and 10-6

(4) Appendices A, B and C

6. CHANGES. Recommendations for improvements to this Manual should be submitted via the chain of command to the Commandant (G-SEN).

7. FORMS AVAILABILITY. Forms mentioned in this Manual may be obtained as indicated in the Catalog of Forms, COMDTINST M5213.6 (series) or electronically in Jet Form Filler on Standard Workstation III.

ERROLL BROWN /s/
Assistant Commandant for Systems

Encl: (1) CH-2 to the Coast Guard Coatings and Color Manual, COMDTINST M10360.3B

Coatings and Color Manual

COMDTINST M10360.3B

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Appendix B: CUTTERS AND BOATS INTERIOR PAINTING SYSTEM

Appendix C: COATINGS AUTHORIZED FOR USE ON CUTTERS AND BOATS

CHAPTER 1. INTRODUCTION

- A. Purpose. The Coatings and Color Manual, COMDTINST M10360.3 (series), is published to promulgate Coast Guard coating and color policy and selected procedures for all vessels, buildings, structures, fixed equipment, and aids to navigation. While the Coatings and Color Manual, COMDTINST M10360.3B, does authorize different coating systems from revision A, implementation of this Manual does not constitute a significant change in Coast Guard policy. Accordingly, this Manual qualifies for Categorical Exclusion 33 under the National Environmental Policy Act (NEPA) and therefore does not require NEPA analysis.

Note: Aircraft and Vehicles. For information on painting or preservation of aircraft, refer to the applicable Technical Notes listing the reference drawings maintained by Aircraft Repair and Supply Center. For information on painting vehicles refer to Motor Vehicle Manual, COMDTINST M11240.9 (series).

- B. Change Process. To ensure this Manual remains up-to-date, coincides with current practices, and continues to meet program needs, future change proposals shall be forwarded as specified in the following paragraphs.
1. Change proposals may be originated at any organizational level. Proposals shall be submitted by letter to Commandant (G-SEN) via their cognizant Maintenance and Logistics Center (MLC). Headquarters units and program managers may submit their proposals directly to Commandant (G-SEN).
 2. MLCs shall review, endorse, and forward approved proposals to Commandant (G-SEN). Disapproved requests shall be returned to the originator with an explanation for disapproval.
 3. Upon receipt, Commandant (G-SEN) will initiate the following action:
 - a. Conduct a thorough investigation of each proposal to justify the need, identify possible conflicts with other directives and publications, and assess the affects of implementation.
 - b. Forward the proposal to the Engineering Logistics Center (ELC) technical point of contact for a technical review.
 4. The ELC responsibilities include:
 - a. Conduct a technical review of all change proposals.
 - b. Return any disapproved change request to the originator with an explanation for the disapproval. Maintain custody of all approved change requests for inclusion into the next change to the manual.
 - c. When directed by Commandant (G-SEN), collate all change proposals and supporting documentation into a package and forward to Commandant (G-SEN) for concurrent clearance routing and approval.
 5. Commandant (G-SEN) is the final approving authority and has overall responsibility for the Coatings and Color Manual, COMDTINST M10360.3 (series).
 - a. All approved changes will be promulgated by future change notices to this Manual.
 - b. Changes that require immediate action shall be submitted directly to Commandant (G-SEN) via message, information copy to the ELC and MLCs.

- C. Exemptions. All units shall comply with the requirements of The Coatings and Color Manual, COMDTINST 10360.3(series) unless otherwise authorized by G-SEN. G-SEN may authorize variance from this manual for color, prototype, and material substitution. For cutters and boats, ELC may authorize variance from this manual for prototype evaluation purposes only (ELC(024) for non-standard boats, ELC(01) for cutters and standard boats). For shore facilities and buoys, Commandant (G-SEC) may authorize variance from this manual for prototype evaluation purposes only.

Units seeking a waiver from this manual for cutters and boats shall submit their request to Commandant (G-SEN), via their cognizant MLC(v), copy ELC(01) and ELC(024). Units seeking a waiver from this manual for shore facilities and buoys shall submit their request to Commandant (G-SEN) via their cognizant MLC(s) and Commandant (G-SEC).

Units seeking to test new coating systems or materials on cutters and boats shall submit prototype requests to: ELC(01) for standard boats and ELC(024) for non-standard boats; via their cognizant MLC(v); copy to Commandant (G-SEN), ELC (024) if appropriate, non-cognizant MLC(v), and the Acquisition Program Manager, if appropriate. Letter reports of performance data will be described in the approval document.

Units seeking to test new coating systems or materials on shore facilities and buoys shall submit prototype requests to Commandant (G-SEN) via their cognizant MLC(s) and Commandant (G-SEC).

- D. Distribution. Commandant (G-SEN) shall determine distribution of this Manual. Requests for changes to the distribution should be submitted on "Request for Allowance Change" (Form CG-5323), addressed to Commandant (G-CIM-3), via the chain of command.
- E. Ordering. The Directives Publication and Reports Index (DPRI), COMDTNOTE 5600 provides guidance for ordering The Coating and Color Manual, COMDTINST M10360.3(series), and its associated changes. Form CG-4428, Request For Directives, shall be completed and forwarded to the appropriate stockpoint. The Manual is also available on the Commandant (G-SEN) website at <http://cgweb.comdt.uscg.mil/g-sen/gsen.htm> and the Coast Guard Directives website at <http://www.uscg.mil/ccs/cit/cim/directives/welcome.htm>
- F. Manual Changes. Denoted by bold type.
- G. Feedback. All errors, omissions, discrepancies, questions, and suggestions for improvement regarding this Manual can be reported on the Naval Engineering Forum website at <http://cgweb.lant.uscg.mil/vdiv/NEForum/> under the "Paint" category.

H. Points of Contact.

1. **Manual Manager: Office of Naval Engineering, Environmental Projects**
(G-SEN-3), (202) 267-2003
2. **ELC Coatings Technical Expert: (410) 762-6739**
3. **MLCA(vs) Coatings Technical Expert: (757) 628-4573**
4. **MLCP(vs) Coatings Technical Expert: (510) 437-5984**

CHAPTER 4. PAINTING ORGANIZATION AND SUPERVISION

A. Frequency Of Painting.

1. General. The principal objective of painting is to prevent deterioration of the substrate at a minimum cost. The recommended method of protection is a condition-based paint program i.e., continuous inspection and painting as necessary. Condition-based painting is preferable to completely repainting after the original coating has failed because the latter results in an unsightly surface, expensive preparation before repainting, and possible deterioration of structural members. Condition-based painting is preferable to complete repainting at pre-determined intervals where repainting may be too late in cases where deterioration has already taken place, but completely unnecessary in others. Careful record keeping of paint activities is also recommended to aid in selecting the best paint system and painting procedures.
2. Interior Surfaces. Interior surfaces are generally painted more frequently than necessary, the painting being done for appearance rather than protection. Excessive repainting results in paint film failure due to films that are either too thick or incompatible.
 - a. Since interior paint films are generally renewed due to yellowing or staining rather than mechanical film failure, the paints selected for interior use are designed to hold up under repeated washing. Scrubbing the surface with detergent and water will usually result in a reasonably clean, fresh appearance.
 - b. Interior painting should normally be accomplished at intervals of 3 years or greater. Shorter intervals result in wasted time and paint on surfaces where the paint film is intact and only needs to be cleaned.
3. Exterior Surfaces. The frequency of painting should be optimized to repaint prior to failure of the paint film. Touch-up painting between the scheduled periods of large scale repainting is adequate to protect the surface and impart a satisfactory appearance. See Chapter 9 – Cutters and Boats General Information and Maintenance Painting for more detailed information on frequency of painting for cutters and boats.
4. Preventive Maintenance. Paint systems do not deteriorate uniformly. Even when they are applied by skilled painters, some pinholes, gaps, and breaks at sharp edges or seams are often present. Left unattended, corrosion and deterioration will initiate at these points. Spot painting describes the painting of only the small or localized areas in which the coating has begun to deteriorate. Not only does spot painting save costly surface preparation and repainting of large areas, but the life expectancy of the paint system and structure can be extended considerably. Furthermore, when repainting is desired to achieve adequate film thickness or for uniform appearance, it can be accomplished economically with the minimum number of coats, since the surface will be in sound condition. An added advantage derived from preventive maintenance is the detection of faulty structural conditions or problems caused by leakage or moisture.

B. Weather Conditions. Weather conditions for painting are an important factor for exterior painting. In the absence of specific manufacturer guidelines to the contrary, the following requirements shall be adhered to.

1. To ensure a dry surface, the temperature of the surface must be 5°F above the dew point temperature. If the temperature of the surface to be painted is at or below the dew point temperature, condensation may blister the paint film. Visual examination of the surface for condensation cannot be relied upon since condensation cannot be detected until it is in an advanced stage. The dew point is determined by the relative humidity in relation to the air temperature.

2. During winter, spring and fall the combination of short days and extreme weather conditions limit available time for paint application. Delay the start of painting in the day until dew and frost have disappeared and the temperature of the surface is above the dew point. The painting must be further shortened by stopping the work at least two hours before the temperature of the surface is expected to drop below the dew point. This allows the paint time to set before being exposed to moisture. Regardless of the season or temperature, do not paint in fog, mist, drizzle, or rain.
- C. Procurement of Paint. Open purchase procurements should not be used unless a government source of supply is not available or when emergent conditions exist and a government source cannot meet delivery requirements. For a complete description of procurement regulations, see the Coast Guard Simplified Acquisition Procedures Handbook COMDTINST M4200.13 (series). GSA offers a variety of procurement vehicles to obtain coatings and supplies with or without a National Stock Number (NSN).
1. GSA Advantage! Online shopping service is an electronic ordering system designed to make products and services offered through GSA available online. The system allows users to browse, perform keyword searches on product-specific information and assemble and place an order. When ordering through GSA Advantage!, a Smart Pay Card may be used, orders may be placed via the standard MILSTRIP procedures or an order faxed directly to the contractor.
 2. Contractor-Direct Ordering. Orders may also be placed directly with contractors on a Multiple Award Schedule, also known as Federal Supply Schedule. This is a listing of contracts awarded by GSA to responsible companies that offer commercial services or products, at varying prices, provided that prices are determined fair and reasonable.
 3. Military Interdepartmental Purchase Request (MIPR). DD Form 448 may be used to order items on schedule when customers have a special project or for high dollar items. This form may be used to order a multitude of items on one or more contracts and just attach a bill of material(s).
 4. MILSTRIP. The Form DD 1348-6 may also be used to submit exception data requisitions. Descriptive data is required when ordering non-NSN listed items, such as those on Multiple Award Schedule, and when a specific color or material is required. When submitting non-NSN listed orders, be certain to cite all the data required to purchase the item, such as name, part number, size, color, vendor, contract number, etc.
- D. Ordering and Receipt of Paints. Most vessels and shore units maintain paint lockers and keep an allowance of paint on hand. These allowances are necessarily kept low because paint will deteriorate in the container. Prior to a scheduled painting, obtain larger paint stocks as necessary to meet the projected demand.
1. To prevent costly waste of paints due to age deterioration, always use the oldest paints first. Reference to the shelf-life extension program is encouraged to minimize wastes.
 2. When ordering paints and related supplies, always request the Material Safety Data Sheet (MSDS). The MSDS provides valuable information about the proper handling of a product. The Emergency Planning and Community Right-To-Know Act (EPCRA) and Pollution Prevention (PL), COMDTINST M16455.10 (series), requires that MSDS's be obtained prior to purchasing a hazardous material. Coatings with hazardous toxic materials should be eliminated as acceptable substitutes with less toxicity are made available.
 3. To estimate the amount of paint needed for a particular job:
 - a. Use table 4-1 to determine coverage of a flat surface in square feet per gallon. Table 4-1 takes into account the type of paint (some paints leave thicker films than others) and the material being covered (variable material absorption rates).

- b. Multiply the figure from table 4-1 by the appropriate surface irregularity factor from table 4-2. The resulting coverage figure should be a reasonable estimate of the surface area that a gallon of paint will cover.

TABLE 4-1

Coverage in Sq. Ft. Per Gallon on a Flat Surface

Surface and Material	1st or Primer Coat	2nd Coat	3rd Coat
Siding and Trim Exterior Oil Paint	350	400	450
Porch Floors and Steps Deck Paint	300	400	450
Asbestos Wall Shingles Exterior Paint	150	300	
Shingle Siding Exterior Oil Paint	250	300	
Shingle Roofs Roof Paint	100	200	
Brick Exterior Oil Paint	150	300	
Interior Doors and Windows Interior Gloss Enamel	350	400	450
Walls, Smooth Finish, Plaster Interior Gloss or Semi-Gloss Oil Paint	350	400	450
Interior Latex Paint	450	500	
Plasterboard (Sheetrock)			
Interior Gloss or Semi-Gloss Oil Paint	400	450	
Interior Latex Paint	450	500	
Metal			
High Build Epoxy (5 mils)	165	165	
Exterior Enamel	350		

TABLE 4-2

Surface	Irregularity Factor
Vessel Overheads	1.50
Bulkheads	1.70
Building Ceilings	1.90
Walls	1.80

4. All paint products that are received should be delivered in original, unopened containers with the following information:
- Product Name/No.
 - Manufacturer
 - Batch No.
 - Date of Manufacture
 - Shelf Life
 - Product Data/ASTM F718 Sheet
 - Material Safety Data Sheet (MSDS)
 - Certificate of Compliance (COC)

E. Organizing for the Job. Careful organization is necessary to ensure safety, efficiency, and quality. Accordingly, the following guidelines are recommended:

1. Apply Operational Risk Management principles, in accordance with Operational Risk Management, COMDTINST 3500.3(series), to manage Occupational Safety and Health risks. Contact the cognizant MLC (kse) for assistance.
2. Use only experienced personnel as supervisors. This is especially important in the operation of specialized equipment and in the use of highly toxic materials. Supervisors must have a thorough knowledge of painting procedures, maintenance procedures, operation and maintenance of equipment, and safety precautions. All jobs must be checked frequently to ensure personnel are preparing surfaces properly, paints are used properly with regard to mixing and conditioning, application is uniform and at proper film thickness, and proper drying time is allowed between coats. Supervisors are responsible for recording work progress, gallons used, and for daily project and job acceptance inspection reports. Supervisors are responsible for proper identification and disposal of any hazardous wastes resulting from the job.
3. Maintain a clean, well-ventilated paint mixing room and paint locker.
4. Develop a full knowledge of various surfaces and how to prepare them for painting.
5. Consider weather conditions and avoid painting when conditions are unfavorable.
6. **A Coatings Preservation QA Checklist found in Table 4-3 provides some general guidelines for inspecting the surface preparation and application of a coating.**

F. Paint Records.

1. Maintenance of paint records is essential for evaluating the performance of coating systems. It allows for performance versus time comparisons, thus distinguishing high performance systems from substandard ones. Aboard ship this information is entered in the Hull History as required by the Naval Engineering Manual, COMDTINST M9000.6(series). For small boats, this information should be kept in the boat record. At shore establishments, a Painting Log should be maintained. These records should have separate pages for each compartment or room and for the exterior of superstructures or buildings. The following information should be recorded whenever complete repainting is done:
 - a. Date of application.
 - b. Area painted.
 - c. Name of each finish material used, number of coats, specification number, name of manufacturer, date of manufacture, and manufacturer's lot number.
 - d. Number of gallons of each type paint used.
 - e. Temperature.
 - f. Dewpoint.
 - g. General statement of weather conditions.

TABLE 4-3 COATINGS PRESERVATION QA CHECKLIST

CHECKPOINT 1 - COATING SYSTEM COMPLIANCE

_____ Ensure all coatings are in compliance with Coatings and Color Manual.

CHECKPOINT 2 - PAINT STORAGE

_____ Ensure all coatings are maintained at a temperature of 65 to 85°F at all times.

CHECKPOINT 3 - AMBIENT CONDITIONS

_____ Ensure surface and surrounding temperatures are each between 50 and 90°F for water-based coatings, and 35 and 95°F for other coatings, unless the manufacturer specifies otherwise.

_____ Ensure that relative humidity (RH) does not exceed 50% for tanks, voids and vent plenum or 85% for all other areas (except surfaces being coated with Euronavy ES301, that has an acceptable RH range of 10-100%) from surface preparations through final curing of topcoat.

CHECKPOINT 4 - PRE-SURFACE PREPARATION

_____ Prior to surface preparation, remove surface contaminants (soluble salts, loose rust, mud and marine growth) with 3000 psi minimum fresh water wash down. If oil/grease are present, perform solvent cleaning per SSPC SP-1.

CHECKPOINT 5 - SURFACE PREPARATION

_____ Verify environmental conditions (see CHECKPOINT 3).

_____ Ensure cleanliness of prepared surface is as per specification (i.e. SSPC SP-12, SP-11, SP-10...).

_____ Check surface anchor profile.

_____ Check soluble salt levels (5 measurements per 1000 sq ft) and ensure levels are at or below 5 micro-grams/sq cm for non-immersed applications, and 3 micro-grams/sq cm for immersed applications.

CHECKPOINT 6 - PRIMER COAT APPLICATION

_____ Verify environmental conditions (see CHECKPOINT 3).

_____ Verify proper mixing and stand-in (induction) times.

_____ Ensure no paint is applied when the temp. is expected to drop to freezing before the paint has dried.

_____ Ensure surfaces are completely dry and surface temperature is at least 5°F above the dew point (Euronavy ES301 may be applied over damp surfaces).

_____ Verify wet film thickness at random, to prevent under or over application.

_____ Brush out all runs, sags, drips and puddles.

_____ Perform visual inspection for holidays and other defects.

_____ Verify dry film thickness.

CHECKPOINT 7 - STRIPE COAT APPLICATION

_____ Verify environmental conditions (see CHECKPOINT 3).

_____ Ensure overcoating window is as per manufacturer's instructions.

_____ Brush-apply un-thinned coat of same primer paint over edges, weld seams, cut-outs, and areas of complex geometries at 3-4 mils wet film thickness (WFT).

CHECKPOINT 8 - TOP COAT APPLICATION

_____ Verify environmental conditions (see CHECKPOINT 3).

_____ Ensure overcoating window is as per manufacturer's instructions.

_____ Verify proper mixing and stand-in (induction) times.

_____ Verify wet film thickness at random, to prevent under or over application.

_____ Brush out all runs, sags, drips and puddles.

CHECKPOINT 9 - FINAL INSPECTION

_____ Verify final system dry film thickness.

_____ Verify system cure for service resumption (i.e., u/w body surfaces: 5-8 hours at 77°F or potable water tanks: 7 days at 77°F.)

CHECKPOINT 10 - RECORD KEEPING

_____ Complete, sign and submit all QA Inspection Forms.

2. In addition to recording the above information, the date of application may be stenciled on the painted area in an inconspicuous location. This practice will aid in evaluating coating system performance versus time. A stenciled date may also prevent unnecessary repainting. Finally, the stencil serves as a crosscheck with the Hull History or Painting Log.

G. Contract Painting.

1. When painting is done under contract, specifications must be written to guard against inferior workmanship, materials, and other detrimental factors that may shorten the service life of the paint film.
2. Painting specifications should prescribe weather conditions suitable for painting, surface preparation, the painting systems to be used, paint materials to be used, methods of application, equality of the finished job and the general condition of the premises upon completion.
3. Repair and construction contracts may specify contractor-furnished paint only when the agreement specifies painting by the contractor. Contracts normally require submittals for key materials that demonstrate that those materials conform to contract requirements.
4. Monitoring of preparation and paint application by a Coast Guard inspector is equally important as final inspection. In process monitoring shall supplement final inspection. The completed paint job shall be inspected by a Coast Guard inspector prior to acceptance.
5. Safety requirements contained in this Manual and those specified by the Safety and Occupational Health Manual COMDTINST M5100.47 (series) shall apply to contract painting when Coast Guard personnel health is at risk.
6. Painting specifications shall require contractors to manage and dispose of all hazardous wastes resulting from their operations in accordance with all applicable federal, state, and local requirements.

H. Reports of Deficient Paint. Units receiving defective paint shall refer to the Supply Policy and Procedures Manual (SPPM), COMDTINST M4400.19 (series); Reporting Quality Deficiencies Involving Items, Enclosure 5.4.

CHAPTER 5. PREPARATION OF SURFACES

- A. General. Proper preparation of surfaces prior to painting is essential to achieve maximum coating life. Even the best quality paint will not perform effectively if applied on a poorly prepared surface. The initial cost of adequate surface preparation is more than compensated for by increased durability, minimum repairs, and reduced paint application frequency. The selection of surface preparation systems is typically dependent upon the type and condition of surface to be painted and practical limitations such as time considerations, type of paint to be applied, and safety factors. Many surface contaminants reduce adhesion and cause blistering, peeling, flaking, and under-film rusting. Among these are chemicals, moisture, and efflorescence (atmospheric salt residues). In addition, the following surface defects will result in poor adhesion: irregular weld areas, metal burrs, crevices, sharp edges, weld splatter and flux knots, splinters, nail holes, loose aggregates, and old paints in various stages of failure. Because of their importance, methods of preparing iron and steel are given particular emphasis in this chapter. In addition to specific requirements and guidance, references are also made to specifications and visual standards issued by The Society for Protective Coatings (formerly the Steel Structures Painting Council which has retained the acronym SSPC) and NACE International (formerly the National Association of Corrosion Engineers) For information on obtaining SSPC specifications see Appendix C of this manual.
- B. Health and Environmental Considerations. Prior to conducting surface preparation, review Chapter 2 for safety precautions and review Chapter 3 for environmental regulations (including 3.C, 3.E.2 and 3.F). Prior to conducting any surface preparation, determine if any work will involve lead based paint (LBP) or asbestos. If so, consult 3.C.1 and 3.C.2 as well as Chapter 2.
- C. Surface Cleanliness and Contaminant Removal. Cleanliness of the surface is a critical factor in the performance of a coating system. Contaminants such as oil, grease, soil, drawing and cutting compounds, and soluble salts contribute to coating failures and must be removed from the surface. The presence of oil and grease impairs coating adhesion. Soluble salt contaminants such as sodium chloride can cause premature coating failure by inducing corrosion under the coating film and blistering of the coating. Although it is often thought that abrasive blast cleaning removes these contaminants, often the result is that the contaminants are actually spread across the surface.
1. Solvent Cleaning. Solvent cleaning removes oil and grease by the use of organic solvents, emulsion or alkaline cleaners, or steam cleaning. Regardless of cleaning agent, first remove any heavy deposits of oil or grease with a scraper. The most common methods of solvent cleaning involve wiping, scrubbing, or spraying the surface with an organic solvent, for example mineral spirits or super high-flash naphtha. Ensure that the cleaning medium and any materials such as rags or brushes are changed frequently to avoid further spread of contaminants. See Solvent Cleaning (SSPC-SP 1).
 2. Removal of Soluble Salts. Most of the cleaning methods found in Solvent Cleaning (SSPC-SP 1), particularly those involving the use of organic solvents, do not adequately remove soluble salts that are contaminants on the surface. The best way to remove them is to dissolve them in water. Thorough rinsing with fresh water may be sufficient, however, low pressure water washing (less than 5000 psi) is more effective, especially when there is pitting of the surface.
- D. Surface Preparation Methods.
1. Hand Tool Cleaning. Hand tool cleaning will remove only loose or loosely adhering surface contaminants. These include rust scale, loose rust, mill scale, and loosely adhering paint. Hand tool cleaning is not an appropriate procedure for removing tight mill scale or all traces of rust. It is primarily recommended for spot cleaning in areas where corrosion is not a serious factor. In

extreme situations, as when areas are not accessible to power tools, hand cleaning may have to be used by necessity. Because hand tool cleaning may remove only the loosest contamination, use primers that thoroughly wet the surface. All applied coats must be capable of overcoming the interference of contaminants left behind after hand cleaning to achieve satisfactory adhesion, assuring maximum anticipated coating life under normal conditions. Before hand tool cleaning, the surface must be free of oil, grease, dirt, and chemicals. This can best be accomplished with solvent cleaners. Then remove rust scale and heavy buildup of old coatings with impact tools such as chipping hammers, chisels, and scalers. Remove loose mill scale and non-adhering paint with wire brushes and scrapers. Finish up by sanding, especially on woodwork. Avoid gouging and deep scratching of the surface. Start painting as soon as possible after cleaning. See Hand Tool Cleaning (SSPC-SP 2).

2. Power Tool Cleaning. Power tool cleaning methods provide faster and more adequate surface preparation than hand tool methods. Power tools are used for removing small amounts of tightly adhering contaminants which hand tools cannot remove. However, they remain uneconomical and time consuming in comparison to blasting for large area removal of tight mill scale, rust, or old coatings. Power tools are driven either electrically or pneumatically and include a variety of attachments. Pneumatic tools are preferred for use on board ship and around water to avoid electric shock. Chipping hammers are used for removing tight rust, mill scale, and heavy paint coats. Rotary and needle scalers are used for removing rust, mill scale, and oil paint from large metallic and masonry areas. Wire brushes (cup or radial) are used for removing loose mill scale, old paint, weld flux, slag, and dirt deposits. Grinders and sanders are used for complete removal of old paint, rust, or mill scale on small surfaces and for smoothing rough surfaces. As with hand tools, care must be exercised with power impact and grinding tools not to cut too deeply into the surface. Care must also be taken when using wire brushes to avoid glazing metal surfaces and thus prevent adequate adhesion of the subsequent coatings. As environmental regulations have tightened, power tool manufacturers have responded by developing vacuum attachments and tools with integral vacuum ports to reduce dust and collect debris as it is removed from the substrate. Use of these tools is encouraged to minimize health hazards and prevent paint dust and chips from escaping to the air and water (See also Chapter 3, Environmental Laws and Policy). Painting must be started and completed as soon after cleaning as possible. See Power Tool Cleaning (SSPC-SP 3) and Power Tool Cleaning to Bare Metal (SSPC-SP 11).
3. Abrasive Blast Cleaning. Blast cleaning abrades and cleans through the high velocity impact of metal shot, metal or synthetic grit, or other abrasive particles on the surface. Abrasive blasting is most often used on metal structures but may also be used with caution on masonry substrates. It is by far the most thorough of all mechanical treatments. There are four degrees of blast cleaning recognized by the SSPC and NACE International. Approximate cleaning rates are shown in Table 5-1.

TABLE 5-1
Rate of Cleaning
(Approximate cleaning rates using 100 psi with a 5/16 in. nozzle)

<u>Degree of Blast Cleaning</u>	<u>Area rate, ft²/hour</u>
SP5 White metal	100
SP10 Near-white	175
SP6 Commercial	370
SP7 Brush-off	870

- a. White Metal Blast Cleaning: (SSPC-SP 5/NACE 1) Blast cleaning to white metal is the highest level of blast cleaning. It is used for coatings that must withstand exposure to very corrosive atmospheres where a high cost of surface preparation is considered to be warranted. Blast cleaning to white metal removes all rust, mill scale, and other contaminants from the surface. This will assist in maximum paint system performance but is generally uneconomical for all but the most critical applications.
 - b. Near-White Blast Cleaning: (SSPC-SP 10/NACE 2) In this procedure the blasted surface will show shadows, streaks and/or discolorations but they will appear across the general surface area and not be concentrated in spots. Thus, the evaluation of the completed cleaning job must be a visual judgment. This preparation effects a 10 percent to 35 percent savings over white metal blasting and has proven to be satisfactory for many of the special coatings developed for long-term protection in moderately severe environments, including those specified in this manual for vessels.
 - c. Commercial Blast Cleaning: (SSPC-SP 6/NACE 3) Commercial blast describes the removal of all loose scale, rust, and other surface contaminants. This method of surface preparation will result in a high degree of cleaning, and is generally considered adequate for the majority of paint systems under normal exposure conditions.
 - d. Brush-Off Blasting Cleaning: (SSPC-SP 7/NACE 4) This is a relatively low cost method of cleaning to remove old finishes in poor condition, loose rust and loose mill scale. Brush-off blasting is not intended for use where severe corrosion is prevalent, but to supplant hand tool and power tool cleaning where blast-cleaning equipment is available.
4. Abrasive Blast Cleaning Procedures. Blast cleaning involves the high velocity impact of abrasive particles on the surface. The abrasive is discharged, either wet or dry, under pressure. The wet system differs from the dry in that water, or a solution of water and rust inhibitor, is incorporated with the blast abrasive. The water is either mixed with the abrasive in the pressure tank or is introduced into the blast stream just behind or at the blast nozzle. All blasted metal surfaces require prime painting the same day to prevent new rust from forming. Metal or synthetic shot, grit, or similar abrasives are used where recovery of the abrasive is possible. The grit must be of a size sufficient to remove surface contamination without working the surface to excess. Overworking creates extreme peaks and valleys (anchor pattern) on the surface which require an additional buildup of the applied paint film for adequate protection. The peaks, if too high, can rust and cause premature paint failure because they stick up through the paint film (see table 5-2). Abrasive blasting equipment should be selected to ensure hoses, fittings, nozzles, compressors etc. are sized correctly for efficient operation. Review Chapter 3 for environmental considerations when conducting abrasive blasting, including 3.C.3 and 3.E.2. Also, review 3.F for proper disposal procedures since abrasive blasting may generate hazardous waste.
- a. Conventional Dry Blasting. Conventional blast cleaning is a term used to designate the usual method of field blasting, in which no effort is made to alleviate the dust hazard or reclaim the blast abrasive. This procedure precludes the need for special rinsing, as required for wet blasting, but requires that health precautions be taken to protect the operator and other personnel in the area from the fine, abrasive dust. Machinery in the vicinity must also be shielded. After blasting, the surface must be brushed, vacuumed, or air cleaned to remove residues or trapped grit. This form of blasting is prohibited in many locations and should be avoided.
 - b. Dry Vacuum Blasting. Vacuum blasting is a method which minimizes the dust hazard and in which the blast abrasive is reclaimed. This procedure, also known as dry honing, prevents most dust from escaping; thus, precludes most air emissions. The vacuum method of blasting is less efficient than conventional blasting methods on highly irregular surfaces because of the poor vacuum on such surfaces. However, vacuum blasting may be efficient and economical for

cleaning repetitive, small-scale surfaces in a shop. The process results in considerable savings in abrasive costs. By decreasing the dust, dry blasting also reduces health hazards and environmental impacts.

TABLE 5-2
Effect of Abrasive

Abrasive Type Profile	Mesh Size	Max. Profile Height (mils)	Aug. Max Height (mils)
Steel Shot S-230	20	2.9 ± 0.2	2.2 ± 0.3
Steel Shot S-280	18	3.5 ± 0.3	2.5 ± 0.4
Steel Shot S-330	16	3.8 ± 0.4	2.8 ± 0.5
Steel Shot S-390	14	4.6 ± 0.5	3.5 ± 0.7
Steel Shot G-50	30	2.2 ± 0.3	1.6 ± 0.3
Steel Shot G-40	20	3.4 ± 0.4	2.4 ± 0.5
Steel Shot G-25	16	4.6 ± 0.5	3.1 ± 0.7
Steel Shot G-14	12	4.6 ± 0.5	3.1 ± 0.7
Heavy Mineral Sand; Medium-Fine	3.5 ± 0.4	2.6 ± 0.4	
Flint Shot; Medium-Fine	3.5 ± 0.4	2.7 ± 0.4	
Silica Sand *	4.0 ± 0.5	2.9 ± 0.4	
Boiler Slag; Medium	4.6 ± 0.5	3.1 ± 0.5	
Boiler Slag; Medium	6.0 ± 0.7	3.7 ± 0.7	

Note: * See health hazards associated with silica sand abrasive blasting in Chapter 2 - Safety and Occupational Health.

- c. **Wet Blasting.** This method reduces the dust associated with blasting to a minimum, and can be very effective on wood, transit, concrete, and masonry structures. However, wet blasting may not be suitable for all types of work. Steel structures containing a large number of ledges formed by upturned angles and horizontal girders, present a large amount of troublesome cleanup. Wet sand and other blast residues trapped on these ledges are more difficult to remove than dry materials. Also, a sufficient amount of sludge adheres to wet-blasted surfaces requiring removal by rinsing, brushing, or compressed air. Moreover, there is a tendency for the wet-blasted surface to rust even though inhibitor is present in the mixing and rinsing water. Other issues of concern include, but are not limited to: 1) The blasted surface must be thoroughly dry before coatings are applied. 2) Productivity in area coverage rate may be reduced in wet blasting. 3) Residues may be a hazardous waste (see Chapter 3.F.).
5. **Water Jetting.** The preparation standard, Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting prior to Recoating (SSPC-SP 12/NACE 5), applies to water jetting. It is a relatively new technique of surface preparation that is considered to be more environmentally sound than abrasive blasting. Water jetting has also been referred to as hydroblasting.
 - a. The water pressures used determine the work accomplished by water jetting. High-pressure water jetting (10,000 to 25,000 psi) is used to remove loose paint, loose rust, mill scale, and some, but not all, tightly adherent epoxy paint. Ultra high-pressure water jetting (greater than 25,000 psi) is used to completely remove paint from a surface. The use of water at pressures less than 10,000 psi is referred to as water cleaning.

- b. Water jetting does not remove any of the metal substrate. A metal surface that originally had a 3 mil surface profile when previously coated, will still have a 3-mil surface profile after waterjetting unless there has been metal loss due to corrosion or mechanical damage. Therefore, waterjetting is appropriate only for recoating operations where the proper anchor profile is available.
- c. Although an abrasive can be introduced in the water jet stream, the SSPC-SP 12/NACE 5 standard covers the use of water only operations. A water-jetted surface may have to be followed by an abrasive blast to provide the desired surface profile in areas that have been corroded or mechanically damaged.
- d. After waterjetting, the surface should be dry before applying the coating. Flash rusting is almost inevitable. The acceptable level of flash rusting and surface contaminants can be defined by SSPC-SP 12/NACE 5. Surface tolerant coatings should be specified for use on water jetted surfaces.

6. Summary.

- a. Contaminant Removal. Surface cleanliness prior to the start of any surface preparation method and any coating operation is critical. Oil, grease, soil, drawing and cutting compounds, and soluble salts are all contaminants that will degrade the performance of the coating system. Loss of adhesion, underfilm corrosion, and blistering can occur as a result of leaving contaminants on the surface.
- b. Principal Surface Preparation Methods. The principal surface preparation methods can be classified into five categories according to their increasing order of effectiveness:
 - (1) Nominal cleaning with hand or power tools where the corrosive environment is mild to normal and coatings used will satisfactorily adhere to tight residues normally remaining on surfaces after cleaning.
 - (2) Brush-off blasting. This method promotes extension of the life of coatings when the severity of the environment increases.
 - (3) Commercial blast cleaning for preparation required in moderately corrosive atmospheres including immersion in water and exposure to industrial or marine environments.
 - (4) The optimum cleaning procedure including white metal or near-white blasting of ferrous metal surfaces exposed to or in direct contact with strong chemicals, where any degree of rust formation on the surface would be intolerable, or the best possible preparation procedures are otherwise required.
 - (5) Waterjetting is an environmentally sound method of preparation for surfaces that have been previously coated.
- c. Visual Standards. Previous descriptions of surface preparation, although seemingly precise in written terminology, have led to misunderstanding and disagreement in interpretation regarding what constitutes an acceptable surface. The SSPC has developed several pictorial standards to define the degree of surface preparation. The Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast (SSPC-VIS) is a series of color prints that covers Brush-Off Blast Cleaning (SSPC-SP 7), Commercial Blast Cleaning (SSPC-SP 6), Near-White Metal Blast Cleaning (SSPC-SP 10), and White Metal Blast Cleaning (SSPC-SP 5) with four rust grades of hot-rolled steel. The Guide And Reference Photographs For Steel Surfaces

Prepared By Wet Abrasive Blast Cleaning covers wet abrasive blast cleaning to Commercial Blast Cleaning (SSPC-SP 6) and Near – White Metal Blast Cleaning (SSPC-SP 10). The Visual Standard for Power- and Hand-Tool Cleaned Steel (SSPC-VIS 3) covers Hand Tool Cleaning (SSPC-SP 2), Power Tool Cleaning (SSPC-SP 3), and Power Tool Cleaning to Bare Metal (SSPC-SP 11). The Guide and Reference Photographs for Steel Surfaces Prepared By Waterjetting (SSPC-VIS 4/NACE No. 7) covers Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating (SSPC-SP 12/NACE 5). It is recommended that the SSPC Visual Standards be used in conjunction with The Society for Protective Coatings Surface Preparation Specifications in the writing of construction and repair contracts.

- d. Alternative Preparation Methods. Although not yet considered common practice, a number of other surface preparation methods are available including chemical stripping and alternative blast media (sponge, carbon dioxide, dry ice, ice, plastic, etc.). These alternative systems should be considered on a case by case basis and include attention to economic, productivity, environmental and occupational health concerns.
- e. Environmental Considerations. Blast grit shall not be allowed to fall into the water. Units shall recycle abrasive blast grit as appropriate. Abrasive blast grit not recycled shall be disposed of properly, and, if it meets criteria for hazardous waste, as hazardous waste. Refer to Chapter 3 - Environmental Law and Policy for more details.

E. Preparation and Repair of Particular Substrates.

- 1. Preparation of Ungalvanized Steel. Metallic surfaces other than aluminum and galvanized steel are best cleaned by dry blasting methods. This removes all mill scale, rust, oil, foreign matter, and old coatings leaving a chemically clean surface that will ensure best paint performance.
 - a. Wet blasting shall be used where dry blasting is impracticable. It is particularly well suited to use at bases and depots not having an area remote from docks or shops available for dry blasting.
 - b. When the bulk of rust and old paint has been removed by roughing tools, finishing tools shall be used to complete the job. The principal finishing tools include hand wire brushes, electric and pneumatic wire brushes, power driven abrasive wheels, discs, or belts, needle type descenders and sandpaper. The use of finishing tools without prior use of roughing tools usually results in low productivity in terms of area finished per unit time, or in the case of power wire brushing, in poor surface preparation due to "glazing" rather than removing particles of rust and old paint. The hand scraper is used on small jobs where power tools are impractical and on flat surfaces, crevices, and corners. The hand wire brush is a useful tool for light rust and for brushing around welds and in places not accessible to the power wire brush. Sandpaper and sanding discs are used where a particularly smooth, clean surface is desired. Also, where old paint is removed only in spots, the edge of the remaining paint film should be sanded so that it gradually tapers down to the bare metal (feathering) giving a uniform appearance to the new paint film. Steel wool should not be used as a substitute for sandpaper since small steel particles become embedded in the paint and form a source of corrosion. After the operation is completed, brush or vacuum the surface to remove paint chips, dirt, and dust.
- 2. Preparation of Galvanized Steel.
 - a. Avoid heavy blast cleaning of galvanized steel. However, it is frequently necessary to lightly blast clean these surfaces to remove corrosion products and roughen the surface to obtain good paint adherence. With adequate care, the galvanized coating will not be removed from the surface during this light cleaning. Immediately after this cleaning, sweep or blow the dust off the surfaces.

- b. Chipping hammers shall not be used on galvanized surfaces. Old paint is normally removed by means of a hand scraper and/or hand or power wire brushes if blast-cleaning equipment is not available.
3. Preparation of Aluminum.
- a. Light brush blasting or power sanding to provide a 1.5 mil anchor pattern will promote paint adhesion on smooth surfaces. Use garnet or aluminum oxide blasting materials/abrasive paper with no metallic content. Old coatings that firmly adhere shall not be removed. The broken edges of old coatings shall be feathered with fine sandpaper. The aged coating shall be reactivated by solvent wiping prior to repainting. Coatings that are old and defective can be removed with a commercial Paint Remover/Stripper conforming to Paint and Lacquer Remover, Solvent Type (TT-R-248). Allow the remover to dwell 10-20 minutes until the coating blisters. Use a plastic or wooden scraper to complete the removal without scratching the aluminum. Rinse the entire surface with fresh water followed by solvent wiping.
 - b. Abrasive blasting and power sanding are not always practical on thin aluminum surfaces. Corrosion on sheet stock and lightweight aluminum shall be removed with a mild acid etch solution. A proprietary product, such as Turco W.O. #1, or the equivalent, may be used per instructions issued by the manufacturer. If desired, the solution can be prepared in-house by adding 16 fluid ounces of phosphoric acid to approximately 3/4 gallon of water, stirring, and then adding 4 fluid ounces of methyl alcohol and enough water to total 1 gallon. The solution shall be brushed on the aluminum until the pitting and corrosion have dissolved. The surface shall then be thoroughly rinsed with fresh water and solvent wiped prior to painting.
 - c. The most effective method for aluminum preparation presuming an anchor pattern was previously established on the substrate is waterjetting combined with a recovery system. This method eliminates loss of substrate material while minimizing environmental impacts. Waterjetting in the absence of a recovery system is not recommended due to potential run-off and subsequent Clean Water Act violation.
 - d. Uncoated marine aluminum surfaces are satisfactory due to the formation of a thin, corrosion resistant oxide film that provides a protective coating in a salt-laden atmosphere and in salt water. Do not apply paint or other coatings to uncoated aluminum surfaces, unless evidence of corrosion is observed. Preserve aluminum alloy machinery parts, which may not be marine grade aluminum, according to the manufacturer's instructions. Fresh water washdowns should be performed frequently.
4. Preparation of Fiberglass. Fiberglass materials are usually coated with a gelcoat which is applied in the shop or a conventional coating which is applied in the field. Surface preparation for application of conventional coatings consists of a thorough cleaning and degreasing, followed by a light hand or power tool sanding. The fiberglass should be repaired as follows if there is any damage or degradation.

WARNING

TO ENSURE THE USE OF PROPER PERSONNEL PROTECTIVE EQUIPMENT, PRIOR TO THE MAINTENANCE OR PREPARATION OF EXISTING FIBERGLASS SURFACES OR THE USE OF FIBERGLASS OR FIBERGLASS PRODUCTS, A THOROUGH REVIEW OF ALL MATERIAL SAFETY DATA SHEETS, CHAPTER 2 OF THIS MANUAL, AND COMDTINST M6260.2 (series), TECHNICAL GUIDE: PRACTICES FOR RESPIRATORY PROTECTION IS REQUIRED. THIS ALSO APPLIES WHEN USING RESINS, CATALYSTS OR OTHER PRODUCTS AND MATERIALS ASSOCIATED WITH FIBERGLASS.

- a. Small Grain Like Blisters. If the gelcoat develops small grain like blisters, repair by popping the blisters, washing them out with distilled water, drying out the gelcoat and painting it with 15 mils of chemically resistant Tank Coating Epoxy (MIL-P-23236). Alternatively, the gel coat can be planed off and dried out before applying the paint.
- b. Large Intermittent Blisters. Blisters the size of almonds spaced on six inch or one foot centers can be feathered out, washed with distilled water, dried, relaminated with fiberglass and painted with 15 mils of chemically resistant Tank Coating Epoxy (MIL-P-23236). If blisters are close together on three inch centers and are beginning to delaminate the glass, then the hull should be planed off to solid material, washed with distilled water, dried, relaminated with fiberglass and painted with 15 mils of epoxy.
- c. Blister Formation. Blisters form in a chemical reaction between the resin and water drawn in under osmotic pressure. Foreign matter like pieces of grit or dirt which get into the resin while it is being laid up will act as a nucleus for blisters. For this reason, fiberglass hulls should not be sand blasted or ground with pads that release grit into the laminate.
- d. Blister Resistant Materials. Polyester resin auto body putty that contains water-soluble materials will almost always blister and should never used on boats. Always purchase marine grade resins and ask for a product with a blister free service record. When epoxy paint is used to seal the hull try to use a 100% solids chemically resistant tank coating (MIL-P-23236) and apply 3 coats to get complete coverage. Blisters form on foreign matter like sand blasting grit molded into the resin. For this reason fiberglass boats should not be sand blasted or sanded with pads which may leave grit in the resin.
- e. Other Fiberglass Problems. Exposed cut fiberglass laminate can wick moisture into the structure that can cause long range damage. Holes and cuts should be sealed. For this reason it is prohibited to drill holes in fiberglass without sealing the wall of the hole with at least 1/32-inch of marine polyester or epoxy. This is particularly important when drilling through cabin tops and transoms. Holes in transoms and fiberglass laminates which are stressed must be reinforced with glass reinforced epoxy.
- f. Fiberglass Repair Kits. Minor repairs can be made using Glass Reinforced Plastic Laminate Repair Kit (MIL-R-19907). Because of possible differences in resins supplied by different manufacturers, care should be taken to follow the instructions supplied with the kit.
- g. Reference Materials. Detailed guidance covering fiberglass repairs is available in commercial reference books, government manuals and training films. Some examples follow.
 - (1) Fiberglass Repairs; A Guide to Fiberglass Repairs on Boats, Cars, Snowmobiles, and Other Structures by Paul S. Patrick that is available from Cornell Maritime Press, P.O. Box 456, Centerville, MD. 21617 Phone: (800) 638-7641.
 - (2) US Navy "Manual for Major Repairs to Glass Reinforced Plastic Boats" (stock no: 0982-LP-019-0010) and "Plastics Preventive Maintenance and Repair Manual" (stock no: 0900-LP-641-0190). These are old but still useful and available from Naval Forms and Publications Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

5. Preparation of Wood.

- a. Wood Preparation - Cutters and Boats.
 - (1) Plane or sand bare wood surfaces to a smooth surface. Numerous commercial plastic wood fillers and putties are available to fill cracks, holes, and dents. Use a marine-grade product

that is recommended by the manufacturer of the finish coat system (synthetic wood finish, spar varnish, or paint) that is being applied. A traditional product that has been specified in the past is Plastic Wood Filler (TT-F-340 - canceled, but still available) for small holes, dents, or cracks.

- (2) Previously painted wood surfaces will be thoroughly washed and cleaned of all foreign matter with a detergent (do not use an alkaline solution such as lye or trisodium phosphate). Allow the surface to dry before painting.
- (3) If the previously applied paint is not sound and adherent, it should be removed. In addition to mechanical methods such as wire brushing, scraping, and sanding, other suitable methods are available.
 - (a) Paint Remover/Stripper can be used by applying liberally with the work in a horizontal position if possible. Do not disturb the crust that forms on the surface. Allow the remover to dwell 10-20 minutes, until the old coating blisters and lifts off. Complete the removal with a scraper. If necessary to remove the last traces of coating, apply a second coat of remover and rub with steel wool in the direction of the grain. Clean the residual slime with paint thinner before application of the new coating.
 - (b) Wet abrasive blasting using relatively low pressures effectively removes scaling and peeling paint from exterior wood. However, resulting surface texture may not be suitable for all finishes. If uncertain, try this method on a small test area first.

b. Wood Preparation - Facilities and Structures.

- (1) New Wood. All new construction lumber shall be clean, smooth and dry before painting. Sand if necessary to smooth and to remove glossy surface from hardboard. Allow adequate time for the wood to dry out. Sealed-in moisture will cause rot. Paint all wood as soon as possible after sanding or milling. Paint will adhere well to wood which has been exposed and will fail quickly on wood which has oxidized and started to turn gray. Scrape off all knots and resinous areas and seal these areas with a coat of a Ready Mixed Aluminum *Paint TT-P-38 (VOC 520g/l)* unless wood is to be oiled or varnished. *Purchase a commercial VOC compliant equivalent sealer if required.* Allow 16 hours drying time before applying other coatings. Fill small dents and gouges with Plastic Wood, TT-F-340. Sand and apply primer. Large dents and gouges should be filled with *Linseed Oil Putty, TT-P-791 after priming. Purchase a commercial VOC compliant grade of Plastic Wood and Putty if required.*
- (2) Floors. Wood floors and stair treads that are to receive a natural finish shall be machine sanded to a smooth even surface and swept clean of dust and grit. Large areas of floor are sanded by a large machine using a continuous band of abrasive paper and usually having a vacuum attachment. The edges of the floor (that can't be reached by the large machine) are sanded with a hand held electric edger with abrasive paper discs or vacuum capture corner/edge devices. The corners have to be scraped by hand.

WARNING

ADEQUATE VENTILATION MUST BE PROVIDED WHEN SANDING TO PREVENT AN EXPLOSIVE DUST OR STRIPPING VAPOR ATMOSPHERE. DO NOT STRIP FLOORS WITH PAINT REMOVER. FOR PROPER RESPIRATORY PROTECTION PROCEDURES, REFER TO COMDTINST M6260.2 (series), TECHNICAL GUIDE: PRACTICES FOR RESPIRATORY PROTECTION.

- (a) Fill nail or screw holes with Plastic Wood TT-F-340. *Purchase a commercial VOC compliant equivalent if required.* When applying plastic wood, do not strike it off flush with the surface since it shrinks slightly upon drying. Leave a slight lump and sand it down smooth after it has hardened. Remove all dust from the surface and pores of the wood by wiping with a tackcloth. If stain is required, apply the stain to a sample of wood to make sure of the correct depth and color.
- (b) A filler coat may be needed for open grain wood such as oak. Apply a thick coat of TT-F-336 Wood filler for floors. *Purchase a commercial VOC compliant grade of filler if required.* Apply by brushing across the grain. Allow the filler to "flatten out" which is characterized by a surface drying appearance, then wipe it into the pores with a pad made of burlap or clean rags. Use a circular motion to ensure filling the pores. Clean excess from the surface with a clean rag, wiping across the grain. If filler sets up too hard for easy wiping, moisten the wiping rag with thinner. If the wiping is accomplished too soon, the filler will be pulled from the pores.
- (c) If the finish peels off the floor, the underside of the floor is probably exposed to moisture. If there is a crawl space, paint the underside of the floor with a moisture resistant coating. If any earth is exposed under the floor, cover it with tar paper or a 6 mil exterior grade of plastic sheet. Be sure that all walls around crawl spaces have adequate grates to ventilate moisture.
- (3) Previously Painted Wood In Good Condition. Painted surfaces which are not chalking, flaking, peeling or cracking should be scrubbed with detergent, rinsed off and allowed to dry for best adhesion. Heavy accumulations of grease and oil can be removed with detergent (do not wash with Trisodium Phosphate or Lye). Always lightly sand gloss and semigloss surfaces to a dull finish before recoating. Mildew accumulation should be washed down with a mixture of water and liquid household bleach, commercial item description A-A-1427 Sodium Hypochlorite solution, prior to scrubbing. Previously stained surfaces which are to be painted should be sealed with *Ready Mixed Aluminum Paint, TT-P-38 (VOC 520 g/l).* *Purchase a commercial VOC compliant grade of sealer if required.*
- (4) Previously Painted Wood in Fair Condition. Painted surfaces which are chalking, flaking, peeling or cracking should first be scraped to remove all loose paint. Sand remaining paint and exposed wood to a fresh surface. All gloss and semigloss surfaces should be sanded to a dull finish to ensure good adhesion.
- (5) Previously Painted Wood In Poor Condition. Multiple layers of paint in various stages of failure are an unsound substrate and produce an unattractive finished product. Paint in very poor condition should be scraped off and sanded down to a new surface. When sanding or scraping is inadequate, a high pressure water blast may be more effective or the paint may be removed with an alkaline, solvent-free paint remover such as Peel Away I or equal. As a last resort, the paint may be heated with a torch or heat gun and scraped off.
- (a) Oil based and water based paints can be removed with solvent free alkaline paint remover. This type of remover usually will not work well on epoxy, polyurethane, vinyl or lacquers. Apply a thick coat with an old brush or spray large areas and allow to stand over night. Scrape off the residue carefully without scarring the wood. A cropped stiff brush will work well on contoured molding. Rinse with water, scrub clean and neutralize with a mild acid. Allow the wood to dry, then sand. Alkaline paint removers will corrode aluminum.

WARNING

PREVENT CONTACT WITH SKIN. WEAR RUBBER OR PLASTIC GLOVES. SOLVENT BASED PAINT REMOVERS LIKE MIL-R-46073 USUALLY CONTAIN SUSPECTED CARCINOGENS LIKE METHYLENE CHLORIDE AND USE IS NOT AUTHORIZED WITHOUT PRIOR APPROVAL OF THE COMMANDING OFFICER. DO NOT USE INDOORS. ENSURE ADEQUATE VENTILATION AND WEAR APPROPRIATE RESPIRATORY PROTECTION. REFER TO COMDTINST M6260.2 (series), TECHNICAL GUIDE: PRACTICES FOR RESPIRATORY PROTECTION.

- (b) Paint is removed with a torch or infrared heating gun by heating the paint just enough to cause it to blister and then scraping it off while it is still hot. Do not burn the paint. Keep the torch or heating gun moving. A second worker can follow with scraper. Sand the surface to remove remaining paint and any char after cooling.

WARNING

ALWAYS STATION ONE WORKER WITH A FIRE EXTINGUISHER TO OVERSEE THIS OPERATION. PAINT SHOULD BE BURNED OFF ONLY IN OUTSIDE AREAS BECAUSE GASES ARE TOXIC. APPROVED RESPIRATORS SHALL BE WORN. IF PAINT REMOVAL BY BURNING IS PERMITTED IN A CONTRACT, THE SPECIFICATION SHALL INCLUDE A SPECIFIC DESCRIPTION OF THE METHOD TO BE FOLLOWED. COAST GUARD PERSONNEL SHALL NOT BURN OFF PAINT WITHOUT PRIOR APPROVAL OF THE COMMANDING OFFICER.

- (6) Cleanliness. The final step in every surface preparation is dirt removal. Remove all dirt by brushing vacuuming and wiping with a tack cloth.

6. Preparation of Concrete and Masonry.

- a. Cleaning masonry surfaces depends upon the type of paint previously applied and the type of paint to be used. Oil paints and acrylic emulsion paints may be applied over old, firmly adhering, non-chalking coatings of oil paint or cement-water paint. Rubber solution paints require the complete removal of old coatings of oil paint; the solvents in rubber solution paints will lift undercoats of oil paint.
- b. Where new paint is not compatible with old coatings or where the old coating is flaking and scaling, completely remove the old coating. Use scraping, wire brushing, or abrasive blasting if equipment is available. For safety and occupational health regulations see General Industrial Standards 29 CFR 1910.94.
- c. Where new and old paints are compatible and the old coating is in good condition, surface preparation will consist of removing dust, dirt, efflorescence, oil, and grease. Dust and dirt can be removed by wire-brushing. All old paint should be lightly wire-brushed to make the surface uniform. Oil and grease can be effectively removed by washing with paint thinner followed by detergent and a fresh water rinse.
- d. After the surface has been thoroughly cleaned, loose mortar between masonry courses can be chipped and picked out and the joint brushed thoroughly to remove all dust and loose particles. Dampen the surface before new mortar is applied to prevent absorption of water from the mixture.
- e. Use enough water to make a fairly dry mortar, about the consistency of putty. It should be thoroughly mixed and worked. When filling cracks, use the mortar like caulking material, that

is, tamping it to form a complete bond. When the crack has been tightly packed, smooth the surface with a trowel. When pointing up joints in masonry, the mortar may be applied with a trowel and the surface finished to conform to the old mortar.

- f. A 1:2 cement/sand mixture is recommended for damp basements or masonry exposed to very moist conditions. A 1:2 mixture represents 1 part Portland cement to 2 parts sand, measured by volume. The proportion to be used will depend entirely upon conditions, a large proportion of cement being necessary in cases where excessive moisture prevails.
- g. After the material has hardened, keep the new work wet for several days to increase the strength of the mortar. If work has been done on outside walls, cover them with tarpaulins to protect them from direct exposure to the sun and drying winds.
- h. Latex paints and rubber solution paints may be applied on dry or damp masonry. In very hot weather it is advisable to dampen the surface prior to the application of latex paints.
- i. Conditional surface preparation.
 - (1) New Concrete and Masonry. New concrete must be allowed to cure for 30 days at a material temperature of 75°F before coating. Lower temperatures require longer aging. Concrete surfaces must be dry before paints are applied. A good check for dryness is to tape all edges of a floor tile to the surface for 48 hours. If moisture shows up on the back side of the tile and on the concrete, the concrete must be dried longer. Moisture migrating into the concrete from another source must be corrected before coating. Remove loose sand, dirt, mortar or paint by abrasive blasting or power tools. Smooth concrete surfaces should be abrasive blasted or acid etched with a 10% to 15% solution of muriatic acid. Use 1 gallon for every 75 square feet of concrete. Scrub with a stiff brush until bubbling stops and rinse with cold water. If the desired surfaces texture has not been reached, repeat the etch. Otherwise, flush with cold water, rinse with a 3% solution of Trisodium phosphate to neutralize the acid, and vacuum dry.
 - (2) Old or Previously Painted Concrete or Masonry. Remove all loose paint or chalk efflorescence by scraping, wire brushing or sandblasting. Sandblasting is the most efficient method. Remove oil and grease by scrubbing with a solution of trisodium phosphate (SP grade). Repair all cracks and loose mortar with a 1:2 mixture of cement and sand (by volume). Before applying, add just enough water to this mixture to get a consistency of putty. Dampen cracks before filling. Apply filler by using a coarse fiber paint brush, broad knife, or trowel. Smooth the surface carefully, wetting the tool with water if necessary.
 - (3) Exterior Masonry Walls Below Grade. New masonry walls, below grade, shall normally be waterproofed with a built up membrane of felt and bituminous compounds applied to the outside of the wall. In dry locations where excellent drainage exists, waterproofing can be accomplished instead by applying 2 coats of Acrylic Emulsion Paint, TT-P-19 (250g/l VOC) to the outside of the wall. In older construction excavating buried walls for waterproofing is too expensive. Corrective actions for leaks should include drainage improvements, gutter and downspout repair, and repairs to all cracks and joints.

F. Repair of Surfaces.

- 1. General. All surfaces must be in good condition before painting. Repair or replace degraded wood, concrete, masonry, stucco, metal, plaster, and wallboard. Remove and replace all loose mortar in brickwork. Replace broken windows and loose putty or glazing compound. Patch all cracks or holes in wood, masonry, and plaster. The final surface should be smooth, with no openings or defects of

any kind. These preparatory procedures eliminate the major areas for the entrance of moisture that can lead to blistering and peeling of the paint film.

2. Faying Surfaces. Faying surfaces are the surfaces of similar or dissimilar materials which are fit closely together and fastened. Faying surfaces shall be accomplished in accordance with NSTM Chapter 631. Coat threaded fasteners and parts of aluminum before using with an Antiseize Compound (MIL-T-22361) or Ultra Tef-Gel.
3. Caulking Compounds and Sealants. Caulking compounds are oil or resin based. They are used in fixed joints of wood, metal, or masonry, or in joints with very limited movement. Sealants, on the other hand, are elastomeric, rubber like compounds. They are intended for use in expansion or other movable joints.
4. Putty. Putty is used to fill nail holes, cracks, and imperfections in wood surfaces. It is supplied in bulk form and is applied with a putty knife. Putty is not flexible and should not be used for joints and crevices.
5. Glazing Compound. Glazing compounds are used on both interior and exterior wood and metal window sash either as bedding or face glazing. They are used to cushion glass in metal or wood frames and are not intended to keep or hold the glass in position. Glazing compounds set firmly, but not hard, and have some limited flexibility. They are more flexible than putty. They tend to harden upon exposure with life expectancy estimated to be approximately 10 years if properly applied. Painting over glazing compounds will extend their useful life. Glazing compounds are relatively inexpensive though more costly than putty.
6. Application of Caulking and Glazing Compounds, Putty, and Sealants. All surfaces must be clean and dry to obtain good adhesion. Remove all oil, grease, soot, dirt, loose paint, or old materials. Be sure the crevice openings are large enough to allow an adequate amount of material to be inserted. Prime the substrate when recommended by the manufacturer. If the opening is deep, first insert backup materials such as oakum, foamed plastic or rubber, fiberglass, or fiberboard.
 - a. Gun Grade Caulking Compounds and Sealants. When applying gun grade material, move the gun along the crevice while triggering so the compound is extruded directly into the crevice. Move the gun slowly and steadily, so as to push the bead into the crevice rather than pull it away. Allow the compound to overlap rather than pull it away. Allow the compound to overlap the opening slightly for a better seal and to allow sufficient surface area for adhesion. The best position to hold the gun is at a slight angle with the bevel parallel to the work. The compound should be tooled to ensure close contact with the joint surfaces.
 - b. Knife Grade Caulking Compounds, Sealants, and Putty. When applying knife grade material or putty, use a putty knife and press firmly into cracks or holes until full. Then smooth with the flat side of the knife by sliding it across the surface. The exposed area should be slightly convex to allow for shrinkage.
 - c. Face Glazing. For face glazing, apply a generous quantity of glazing compound into the glazing rabbet, and gently press the glass into the rabbet, leaving a bed of back glazing material of approximately 1/16 inch. Apply glazing points to hold the glass in place. Strip surplus glazing compound at an angle to allow for runoff of condensation. Apply additional glazing compound to the face and tool into place with the aid of a putty knife, applying sufficient pressure to completely fill the void. Tool face glazing approximately 1/16 inch short of sight line to allow paint to overlap onto glass.
 - d. Channel Glazing. For bead or channel glazing, apply a generous amount of the compound to the fixed side and the bottom of the channel. Place non-porous resilient spacer shims (such as vinyl

floor tile) at points around the perimeter of the channel to position glass and prevent squeezing out of compound (keep spacer shims below edge of channel). Press glass into place until intimate contact with spacer shims is made. Spread compound on removable bead and gently press into place. Insert spacer shims between glass and removable bead (opposite spacer shims on fixed side of the channel) and apply pressure to removable bead until intimate contact with spacer shims is made. Fasten bead in place and strip excess compound. When glazing compound has attained a surface skin, apply paint, slightly overlapping the sight line.

7. Patching Materials. Cracks, holes, and crevices in masonry, plaster, wallboard, and wood are filled with patching material. It is supplied either ready for use or as a dry powder to which water is added before use. There are a variety of types depending on the surface and its conditions.
 - a. Patching Plaster. Patching plaster is used for repairing large areas of plaster. It is similar to ordinary plaster except that it hardens quickly. It is supplied as a powder.
 - b. Spackle. Spackling compound is used to fill cracks and small holes in plaster and wallboard. It is very easy to work with and sands very well after it hardens. It is supplied both as a paste and as a powder.
 - c. Joint Compound. Joint compound is used primarily to seal the joints between wallboards. It can also be used to repair large cracks. It is supplied as a ready mixed paste and as a powder and is used in conjunction with perforated tape that gives it added strength.
 - d. Portland Cement Grout. Portland cement grout is used to repair cracks in concrete and masonry. Hydrated lime is often added to slow cure time and lengthen working life.
 - e. Plastic Wood. Plastic wood is a filler suitable for repair work such as filling gouges and nail holes in wood. It is also used for building up and filling in wood patterns and joiner work. It is applied in a manner similar to putty. Sand plastic wood smooth after it has completely dried and before applying paint.
 - f. Application of Patching Materials. When using patching materials on masonry, plaster, or wallboard, the crack should first be opened with a putty knife or wall scraper so the weak material is removed and the patching compound can be forced in completely. Dampen these areas with clear water and apply the compound with a putty knife or trowel, depending on the size of the hole. Level and smooth off the surface allowing it to be slightly convex to allow for shrinkage. Follow manufacturer's instructions explicitly if they are available. None of these materials require attention during drying, except for the Portland cement grout which should be kept damp 3 days for optimum cure.

CHAPTER 6. PAINT MATERIALS

- A. General. This chapter presents information to aid in determining the best product for the job and to explain why the product is best suited for the particular situations (i.e. substrate, painting conditions, desired finish, and the environment to be withstood by the applied finish).

WARNING

MANY OF THE PIGMENTS AND SOLVENTS IN PAINTS REQUIRED BY THIS MANUAL CAN CAUSE SIGNIFICANT HEALTH PROBLEMS. REFER TO CHAPTER 2 AS APPROPRIATE.

- B. Paint Chemistry. Most paints are based on a film forming *vehicle* or binder dissolved in a solvent or emulsified in water. Upon application of the product, it will dry or cure to form a dry, tough coating. Solutions of such vehicles in solvent may be called by various names (e.g., clear finishes are called varnishes if they dry by oxidation or lacquers if they dry by evaporation). If opaque pigments or colors are dispersed in the vehicle, the product is called paint. Pigment concentration can also be varied to produce a high gloss, a semi-gloss, or lusterless (flat) finish. Metallic pigments can be added to varnishes to produce metallic coatings, such as aluminum paints. The major performance characteristics of the coating depend generally on the type of vehicle used. The principal vehicles used in the paint materials covered in this manual are listed alphabetically in this section.
1. Alkyd. Alkyd vehicles are oil-modified phthalate resins that dry by reacting with oxygen from the surrounding air. Alkyd finishes are usually of the general-purpose type, are economical, and are available as clear and pigmented coatings. These are available in flat, semi-gloss, and high gloss finishes and in a wide range of colors. They are easy to apply and, with the exception of fresh concrete, masonry, and plaster, may be used on most surfaces that have been moderately cleaned. Alkyd finishes have good color and gloss and retain these characteristics well in normal interior and exterior environments. Their durability is only fair in corrosive environments. Alkyd finishes are available in odorless formulations for use in hospitals, kitchens, sleeping quarters, and other areas where odor during painting might be objectionable.
 2. Cement. Portland cement mixed with several ingredients acts as a paint vehicle when reacted with water. The paint is supplied as a powder to which the water is added before use. Cement paints are used on rough surfaces such as concrete, masonry, and stucco. They dry to form hard, flat, porous films that permit water vapor to pass through readily. Since cement paints are powders, they can also be mixed with masonry sand and less water to form filler coats to smooth rough masonry before applying other paints. Cement paints can be used on fresh masonry and are economical. The surface must be damp when they are applied, and must be kept damp for a few days to obtain proper curing. They should not be used in arid areas. When properly cured, cement paints of good quality are quite durable. However, when improperly cured, they chalk excessively on exposure and may present problems in repainting.
 3. Epoxy. Epoxy vehicles are made up of two components that are premixed before use: an epoxy resin and a polyamide hardener. When mixed, the two ingredients react to form the final coating. These paints have a limited working or pot life, usually a working day. Anything left at the end of the day must be discarded. Epoxy paints can be used on any surface and can produce a thick film per coat. The cured film has outstanding hardness, adhesion, flexibility, and resistance to abrasion, alkali, and solvents. Major uses are as tile-like glaze coatings for concrete and masonry and for the protection of structural steel and vessel hulls in corrosive environments. Their cost per gallon is

high, but is offset by the reduced number of coats required to achieve adequate film thickness. Epoxy paints tend to chalk on exterior exposure so that low gloss levels and fading can be anticipated; otherwise, their durability is excellent.

4. Inorganic. The major inorganic vehicles used in paints are sodium, potassium, lithium, and ethyl silicates. These are used in zinc dust pigmented primers in which they react with the finely divided zinc metal to form very hard films. Such films are extremely resistant to corrosion in humid or marine environments. Many of these primers also contain substantial concentrations of lead oxides that react with the silicates in conjunction with the zinc to form an even more corrosion-resistant coating.
5. Latex. Latex paints are based on water emulsions of three basic types of polymers: polyvinyl acetate, polyacrylic, and polystyrene-butadiene. They dry by evaporation of water, followed by coalescence of the polymer particles to form tough, insoluble films. They have little odor, are easy to apply, and dry very rapidly. Interior latex paints are generally used either as a primer or finish coat on interior walls and ceilings. Exterior latex paints are used directly on exterior (including alkaline) masonry or on primed wood. They are nonflammable, economical and have excellent color and color retention. Latex paint films are somewhat porous resulting in a lowered susceptibility to blistering caused by moisture vapor. This blistering is a more significant problem with solvent thinned paints. Latex paints do not adhere readily to chalked, dirty, or glossy surfaces. Therefore, careful surface preparation is required for their use. Latex paints are very durable in normal environments, at least as durable as oil paints.
6. Oil. Linseed oil is the major vehicle in oil house paints. These paints are the oldest type of coatings in use and have the longest history of performance. They are used primarily on exterior wood and metal since they dry too slowly for interior use and are sensitive to alkaline masonry. Oil paints are easy to use and give a thick film per coat. They also wet the surface well so that surface preparation is less critical than with other types of paints for metal. They are recommended for hand cleaned iron and steel. Oil paints are not particularly hard or resistant to abrasion, chemicals, or strong solvents, but are durable in normal environments.
7. Oil-Alkyd. Linseed oil vehicles are often modified with alkyd resins in order to reduce drying time, to improve leveling, hardness, gloss, and gloss retention, and to reduce fading while maintaining brushability, adhesion, and flexibility of the oil. One end use is in trim paints applied to exterior windows and doors. Since these areas are relatively small and painted in solid colors rather than tints, they require better leveling, gloss retention, and fade resistance than the rest of the exterior walls. Also, these areas are subject to some handling and therefore, require faster drying and harder finishes. Oil-alkyd paints are also used on structural steel when faster drying finishes are desired. However, somewhat better surface preparation is required than with oil paints.
8. Oleoresinous. These vehicles are made by processing drying oils with hard resins and are generally used either as spar varnishes or as mixing vehicles to be added to aluminum paste to produce aluminum paints. Alkyd finishes are often called oleoresinous because a drying oil is combined with the alkyd resin. Alkyd finishes are usually preferred where better color retention is desired.
9. Phenolic. Phenolic vehicles are made by processing a drying oil with a phenolic resin and are thus a class of oleoresinous vehicles. They may be used as clear finishes or pigmented in a range of colors. The clear finishes may be used on exterior wood and as mixing vehicles for producing aluminum paints. The durability of the clears is very good for this class of finishes (1 to 2 years); the durability of aluminum paints is excellent. Phenolic paints are used as topcoats on metal for extremely humid environments and as primers for fresh water immersion. These paints require the same degree of surface preparation as alkyds but are slightly higher in cost than alkyds. Phenolic coatings have

excellent resistance to abrasion, water, and mild chemical environments. They are not available in white or light tints because of the relatively dark color of the vehicle. Furthermore, phenolics tend to darken from exposure.

10. Phenolic-Alkyd. Phenolic and Alkyd vehicles are often blended to combine the hardness and resistance properties of the phenolics with the color retention of alkyds. This may be done either by blending phenolic resin during processing of the alkyd vehicle or by addition of phenolic resin during processing of the alkyd resin.
11. Polyvinyl Butyral Resin/Phosphoric Acid. This coating is designated as a pretreatment and is listed separately because of its unique properties. It is available in a two part system consisting of the PVB resin in part I and a dilute phosphoric acid mix in part II. The phosphoric acid performs a mild etch on a variety of metals which enhances adhesion. The acid salts and PVB resin combine to provide an organic/inorganic 0.5-mil film compatible with most anti-corrosion primers. The pretreatment wash primer is regarded as a chemical process that is applied before the primer and is not a primer substitute. Do not use any pretreatment wash primers containing chromates.
12. Rubber-Base. Rubber-base vehicles are solvent thinned and should not be confused with latex binders which are often called rubber-base emulsions. They are lacquer type products and dry rapidly to form finishes which are highly resistant to water and mild chemicals. Recoating must be done with care to avoid lifting by the strong solvents used. Rubber-base paints are available in a wide range of colors and levels of gloss. They are used for exterior masonry, and areas that are wet, humid, or subject to frequent washing (e.g., swimming pools, wash and shower rooms, kitchens, and laundry rooms). Styrene-butadiene, when combined with chlorinated plasticizers and silicone resins, is used to produce high-heat-resisting ready-mixed aluminum paints.
13. Silicone. Silicone vehicles are used in two ways: for water repellents and for heat resistant finishes.
 - a. Water Repellents. Dilute solutions (5 percent solids) of silicone resin are of temporary help in reducing water absorption when applied to unpainted concrete or masonry such as brick or stone. They usually do not affect the color or appearance of the treated surface. Cracks and open joints must be repaired before water repellents are applied.
 - b. Heat-Resistant Finishes. Heat-resistant organic finishes containing a high concentration of silicone resins, when pigmented with aluminum, have the ability to withstand temperatures up to 1200°F.
14. Silicone Alkyd. The combination of silicone and alkyd resins results in an expensive but extremely fade-resistant coating for use on smooth metal.
15. Siloxane. Siloxanes, in general, refers to a broad range of resin systems containing the Si-O-Si siloxane bond. This may include silicone, silicate, modified silane and silazane inorganic resin systems as well as hybrid siloxane/organic resin systems e.g. epoxy siloxane and acrylic siloxane. Siloxane resins may be used to formulate coatings with excellent weatherability, heat and chemical resistance.
16. Urethane.
 - a. Oil-Modified Urethanes. These are similar to phenolic varnishes, although more expensive, but have better initial color and color retention, dry more rapidly, are harder, and have better abrasion resistance. They can be used as exterior spar varnishes or as tough floor finishes. Oil

modified urethanes can be used on all surfaces. In common with all clear finishes, they have limited exterior durability.

WARNING

POLYURETHANES OTHER THAN THE OIL MODIFIED TYPE ARE STRONG SENSITIZERS AND REQUIRE SPECIAL HANDLING PROCEDURES TO PREVENT INJURY. CG PERSONAL SHALL FOLLOW THE SAFETY PRECAUTIONS OF COMDTINST 6260.30 (series), POLYURETHANE COATINGS EXPOSURE CONTROL.

- b. Polyurethane Restrictions. Polyurethane coatings that contain isocyanate compounds pose a serious health threat and are therefore prohibited except as required to maintain aircraft or other specific items required elsewhere in this manual such as aids to navigation. This prohibition does not refer to common house hold paints and varnishes which are called polyurethane but are actually alkyd coatings modified with polyurethane. The alkyd-modified polyurethanes are thinned with mineral spirits paint thinner and do not list isocyanate as a hazard on the MSDS.
 - c. Moisture-Curing Urethanes. These are the only organic products presently available that cure by reacting with moisture from the air. They are also unique in having the performance and resistance properties of two-component finishes yet are packaged in single containers. Moisture-curing urethanes are used in a manner similar to other one-package coatings except that all containers must be kept full to exclude moisture during storage. If moisture is present in the container, it will gel.
 - d. Two-Component Urethanes. Urethanes can also be reacted with polyols, polyethers, polyesters, or acrylics to produce extremely hard, resistant and durable coatings. These are vehicles of major interest for use as top coats on structural steel exposed in marine or corrosive environments.
 - e. Aromatic vs. Aliphatic Urethanes. Urethane polymers can be made from isocyanates that are either aromatic or aliphatic. Aliphatic urethanes are preferred for exterior use, despite their high cost, because of their outstanding durability, color, and gloss retention. Pigmented aromatic urethanes are extremely hard, tough, and chemical resistant, but chalk rapidly when exposed to sunlight.
17. Vinyl. Lacquers based on modified polyvinyl chloride resins are used on steel where the ultimate in durability under abnormal environments is desired. They are moderate in cost but have low solids and require the most extensive degree of surface preparation to secure a firm bond. Because of their low solids, vinyl finishes require numerous coats to achieve adequate dry film thickness resulting in a higher total cost of painting relative to most other paints. Since vinyl coatings are lacquers, they are best applied by spray and dry quickly, even at low temperatures. Recoating must be done with care to avoid lifting by the strong solvents that are present. In addition, these solvents present an odor problem. Vinyls can be used on metal or masonry but are not recommended for use on wood. They have exceptional resistance to water, chemicals, and corrosive environments but are not resistant to strong solvents.
18. Vinyl-Alkyd. The combination of vinyl and alkyd resins offers a compromise between the excellent durability and resistance of the vinyls with the lower cost, higher film build, ease of handling, and adhesion of the alkyds. They can be applied by brush or spray and are widely used on structural steel in marine and moderately severe corrosive environments.

C. Paint Pigments. Pigments are chemical compounds in fine particle form which give color and opacity to paint and to a limited degree determine its consistency and general characteristics. The pigment component of paint may be a single pigment, but generally it is a combination of two or more pigments. Paints with a relatively large proportion of pigment have a flat or semi-gloss finish.

1. Extender pigments. Extender pigments are filler materials with little or no opacity. They are used primarily in limited quantities to increase the pigment portion of paints for controlling gloss, diffusing or diluting other colored pigments, retarding, settling, and reinforcing the film.
2. Special Purpose Pigments.
 - a. Lead is no longer authorized as an anticorrosive pigment for paints. Special environmental requirements may apply to any activity relating to lead-based paint. Refer to chapter 3.

WARNING

LEAD PIGMENTS, IF INGESTED OR INHALED, WILL ACCUMULATE IN THE BODY AND MAY PRODUCE LEAD POISONING (SEE CHAPTER 2).

- b. Zinc chromate and hexavalent chromium compounds are no longer authorized as anticorrosive pigments for paints except on aircraft.

WARNING

ZINC CHROMATES AND HEXAVALENT CHROMIUM COMPOUNDS ARE POTENTIAL CARCINOGENS. SPECIAL PRECAUTIONS ARE REQUIRED WHEN APPLYING OR REMOVING THESE COATINGS (SEE CHAPTER 2).

- c. Zinc dust paint films are non-toxic. The combination of adherence, corrosion inhibition of steel, and non-toxic qualities is unique and has made zinc dust pigment suitable for use in coatings for the interior of metal potable water tanks.
 - d. Aluminum pigments' most important property is their ability to "leaf" when suspended in a properly formulated vehicle of oil or varnish. When aluminum paint is applied, some of the flakes are carried to the surface of the paint film and are held there by surface tension, forming an almost continuous metal leaf at the surface. The remainder of the flakes are distributed throughout the film in more or less parallel layers. Because of this arrangement it is difficult for air, light and moisture to penetrate the film. In order to promote "leafing" brush application should always be in one direction only.
 - e. Copper compounds have proven to be the most effective toxic ingredients for use in antifouling paints for both steel and wooden hulls. Cuprous oxide is the least expensive of the compounds and is the principal toxic constituent in many antifouling paints.

D. Solvents and Thinners. Solvents evaporate when the paint is applied, so the proportion of solvent to solid used in a paint determines the thickness of the film applied per coat. In order to obtain satisfactory dry film thickness, solvents should be used only in such quantities as are required to render the proper consistency for application. Too much thinning of paint reduces its dry film thickness giving shorter life to the paint system. Thinners are comprised nearly entirely of VOCs. Use of thinners should be minimized as they defeat the purpose of using low VOC coatings (See VOC section of Chapter 3).

1. Oil, oleoresinous, alkyd and phenolic vehicle paints are compatible with petroleum distilled solvents such as naphtha and mineral spirits. Turpentine has been considered as a general all-purpose thinner for many years. However, due to its high cost, its use is not justified. Mineral spirits, a mixture of straight chain hydrocarbons, will satisfactorily thin most paints and the cost is considerably less. Turpentine, moreover, is a fire hazard due to the danger of spontaneous combustion.
2. Many coatings formulated from synthetic vehicles are not compatible with petroleum distillates and therefore require thinners of higher solvent power. These include the "coal tar" distillates such as toluene, xylene, and solvent naphtha. These distillates are sometimes use in combinations to obtain varying powers of solvency. Examples of this type are synthetic enamel thinner which has intermediate solvent powers, and vinyl paint thinner which has high solvent powers.

TABLE 6-1: Compatibility of Commonly Used Paint Vehicles

Top Coat Primer or weathered paint	Solvent- <u>thinned</u>			<u>Lacquer</u>			Water Thinned (latex)		Chem. <u>reactive</u>
	1	2	3	4	5	6	7	8	9
Alkyd	C	C	C	NR	NR	NR	CT	CT	NR
Silicone alkyd	C	C	C	NR	NR	NR	CT	CT	NR
Phenolic Oleoresinous	C	C	C	NR	NR	NR	CT	CT	NR
Vinyl Alkyd	C	NR	NR	C	CT	CT	CT	CT	CT
Chlorinated rubber	C	C	C	CT	CT	NR	CT	CT	NR
Styrene-butadiene Styrene-acrylate	C	C	C	CT	NR	CT	CT	CT	NR
Acrylic	C	C	NR	CT	CT	CT	CT	CT	CT
Polyvinyl acetate	C	C	NR	CT	CT	CT	CT	CT	CT
Epoxy, catalyzed	NR	NR	NR	CT	NR	NR	NR	NR	CT
Zinc rich epoxy	NR	NR	NR	NR	CT	CT	NR	NR	CT
Inorganic zinc	NR	NR	NR	CT	CT	CT	CT	NR	CT
<u>Notes:</u> C = Normally compatible CT = Compatible with special surface preparation of the weathered coating substrate and/or careful application of topcoat containing active solvents NR = Not recommended because of known or suspected problems. It may be noted that certain combinations marked NR may be used provided a suitable tie coat is applied between the two coatings. Specifications and /or manufacturer's literature should be consulted for guidance 1 = Alkyd 2 = Silicone Alkyd 3 = Phenolic Oleoresinous 4 = Vinyl Alkyd 5 = Chlorinated Rubber 6 = Styrene-butadiene, Styrene-acrylate 7 = Acrylic 8 = Polyvinyl Acetate 9 = Epoxy									

CHAPTER 7. STORAGE, PREPARATION, AND APPLICATION OF PAINT MATERIALS

A. Stowage Areas.

1. Stowage Ashore. Paints shall be stored ashore in accordance the Civil Engineering Manual COMDTINST M11000.11 (series) and the Safety and Occupational Health Manual, COMDTINST M5100.47 (series). Additional storage guidance can be found in the National Fire Code #30 of the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269, Flammable and Combustible Liquids Chapter 1910.106 in the General Industrial Standards 29 CFR 1910.
2. Storage Aboard Cutters and Boats. Proper hazardous material stowage is essential to cutter and personnel safety. Information on hazardous material stowage may be obtained from Commandant (G-WKS) and MLC (kse). NSTM Chapter 670 provides information concerning stowage requirements for flammable and combustible materials.

B. Paint Distribution.

1. Paint materials. Should be rotated so the oldest stocks are used first. Although all paints deteriorate to some extent in storage, the rate of deterioration depends on several factors and a definitive shelf life cannot normally be specified. Use of the shelf-life extension program is encouraged (See Chapter 3.E.3). However, every effort should be made to use paint within one year of manufacture.
2. Ready for Use. Make all paints ready for use before issue by conditioning at the proper temperature and mixing thoroughly. If the paint issued is from used stock, check condition and strain. If the paint can not be mixed to the point of complete uniformity by shaking or stirring it is not usable and should be discarded. Any issued paint that is not used should be properly stored again or properly disposed. Refer to Chapter 3.F. for disposal guidance as the paint may be considered hazardous waste. If only a small amount of paint is left after a job, consider painting some smaller projects to fully use the issued paint and eliminate the need for storage and future expensive disposal.

- C. Containers. Store paint material in full, tightly sealed containers. Avoid partially filled containers. Try to use paint on the job so as to have little or none left over (accuracy in advance estimating will help accomplish this). It is safer to discard small quantities than to use paint that has skinned. Otherwise, place leftover paint in smaller containers, filling them full, and seal. To meet EPA regulations, the content of all containers must be labeled and *readable*. Maintain the MSDS with the new container and copy all information from the original container to the new container as directed the Hazard Communication for Workplace Materials, COMDTINST 6260.21(series).

D. Storage.

1. Storage cabinets. Required for the storage of in-use or working stocks of flammable or combustible paints and thinners, whether in manufacturer sealed containers or in containers which have been opened and resealed.
2. Storage Cabinet Specs. Types that comply with the National Fire Code #30 are commercially available and shall be used for paint storage. These cabinets are constructed in the following manner: The bottom, top, door, and sides of the cabinet are constructed of at least No. 18 gauge steel and are double walled and floored with a 1-1/2 inch air space between inner and outer surfaces. Joints are riveted, welded, or otherwise sealed. The door is secure at three points when latched. The doorsill is raised at least 2 inches above the inner bottom surface of the cabinet. Cabinets should be painted yellow (13538) or as supplied by the manufacturer and shall have the words, FLAMMABLE

-- KEEP FIRE AWAY, conspicuously stenciled or painted in a contrasting color such as red or black.

3. Maximum Quantity. Sixty (60) gallons of flammable products and one hundred and twenty (120) gallons of combustible products are the maximum quantity allowed to be stored in any one cabinet. Not more than three such cabinets may be placed in any work center or room. Factory sealed stocks in excess of these amounts shall be stored in an outside storage building or specially designed interior room or compartment provided the storage facility is built, protected, and used as required by regulation.
 4. Prohibitions. Uncovered containers or containers that cannot be resealed shall not be stored in cabinets or other locations and shall be discarded after use. Refer to Chapter 3.F. for disposal guidance as the containers may be considered hazardous waste. Flammable storage cabinets or other such facilities shall not be used to store rags, oxidizers or materials that could cause spontaneous ignition.
 5. Minimization. Stowage aboard vessels should be minimized to only mission essential stock to prevent compounding of personnel and fire hazards. Stowage shall be limited to flammable liquid storerooms with the exception of in-use stock that may be stowed in paint mix rooms. For further guidance, see the Naval Engineering Manual, COMDTINST M9000.6 (series), chapter 670 and Naval Ships' Technical Manual, chapter 670.
- E. Paint Conditioning and Mixing. Paints consist of two principal components: the solid pigment and liquid vehicle. The purpose of conditioning and mixing is to re-disperse or re-blend settled pigment with the vehicle, to eliminate lumps, skins, or other detriments to proper application, and to bring the paint materials to their proper application temperature. All paint materials should be placed in the paint shop at least 24 hours before use in order to bring their temperatures between 65°F and 85°F. Paints are then mixed, thinned, tinted, and strained, as appropriate.
1. Mixing. Mix paint materials just prior to issuance. Mixing procedures will vary among different types of paints. Regardless of the procedure used, take care to avoid the incorporation of excess air through over-mixing. Mixing is done by either manual or the more preferred mechanical methods to ensure maximum uniformity. The two most commonly used types of mechanical mixers are those that vibrate the full, sealed container, and those that utilize propellers that are inserted into the paint. Manual mixing is less efficient than mechanical methods in terms of time, effort, and results. Five-gallon containers may be stirred manually, if done with care. To accomplish this, half of the paint is poured off into an empty container and the remainder is then stirred thoroughly, being certain to scrape off and break up any settled matter on the bottom or lower sides of the container. Stirring is continued as the other half of the paint is returned slowly to the original container. The stirred paint must have a completely blended appearance with no evidence of colored swirls at the top, indicating unmixed pigment or vehicle. There should be no evidence of lumps indicating the presence of unmixed solids or foreign matter.
 - a. Sequence of Operations. Complete conditioning and mixing of ready mixed paints as well as multi-component paints is mandatory prior to introducing thinners or other additives. Manufacturers' label directions regarding proper mixing shall be strictly followed.
 - b. Boxing. Boxing is a mixing procedure where a material is repeatedly poured back and forth between two containers. Because paints tend to settle during storage, ensure they are uniform by boxing all paints before use. If different production batches are used (check batch numbers), compare them for color and gloss after boxing. If any differences are observed, either use them in different areas or box enough for the job using larger containers.

- c. Induction Times. Many multi-component coatings, particularly epoxies, require a period of time after mixing of the components where the critical chemical reaction is allowed to initiate prior to application. This is called the induction time. Most commercial high build epoxies will have induction times of 15 to 30 minutes.
- 2. Tinting. Avoid tinting as a general practice. Purchase paints in the desired color to minimize waste and errors in on-the-job tinting. This procedure also eliminates the problem of matching special colors at a later date. One exception is the tinting of intermediate coats to differentiate and ensure there are no missed areas between sequential coats.
- 3. Straining. Strain paints after mixing if there is any evidence of skins, lumps, color flecks, or foreign materials. First remove skins from the paint surface, thoroughly mix the paint, thin to application viscosity if necessary, then strain through a fine sieve or commercial paint strainer. To avoid clogging, use straining as a standard procedure in all instances where the paint is to be applied by spray gun.
- 4. Thinning.
 - a. Paints should be ready for application by brush or roller when received. While thinning is frequently required for spray application, avoid the arbitrary addition of thinners. When thinning is necessary, it is to be done by experienced personnel using only compatible thinning agents recommended in label or specification instructions.
 - b. Paint thinners, other than water, usually have a very high VOC content; thus, adding a thinner to a paint increases the paint's VOC content (transforming a low VOC content paint to a high VOC content paint). Paint thinner that is a substance other than water will not be used unless the following condition exists: prior to any paint thinner being added, the paint has a VOC content that is lower than the maximum ***as applied VOC content limit***. If this condition exists, then thinner can be added, but, only in an amount that ensures that the paint with thinner added is lower than or equal to the maximum ***as applied VOC content limit***. See Chapter 3 for VOC content limits.

F. Brush Application.

- 1. Bristle Types. The quality of the bristle largely determines the quality of the brush. Both natural and synthetic bristles are used for paintbrushes. Brushes with synthetic bristles should have "flag" ends to assure smooth application of paint. Natural bristles are thick at the butt end and taper to the flag or splayed end. Synthetic bristles like nylon are splayed during manufacture.
- 2. Brush Components. The component parts of a brush are generally as follows:
 - a. The handle is made of hardwood or plastic and is shaped to fit the hand for the specific type of work the brush is designed to perform.
 - b. The setting of the handle holds the bristles in the proper formation.
 - c. The ferrule, which is the connecting link between the handle and the stock (bristles), must be correctly and sturdily constructed so the handle and the stock will not come apart. Ferrules are generally made of steel, nickel, tinplate, or aluminum.
 - d. The stock is the working part of the brush and generally contains natural or synthetic bristles.
- 3. Types of Brushes.

- a. Disposable Brushes. Use of disposable brushes eliminates the need to use thinners for cleaning purposes and reduces the accumulation of great quantities of paint slop. Disposal costs for paint slops generated from cleaning brushes is exceedingly expensive and the Coast Guard is liable for that waste for an indeterminate period. Whenever disposable brushes offer suitable application quality and are found to be cost effective, their use is preferred.
- b. Flat Wall Brushes. Flat brushes have a narrow rectangular cross section. They are available in widths from 2 in. to 5 in. The bristles vary in length according to the width of the brush. The 4-in. brush with 4-1/2 in. bristles is suitable for many kinds of general painting.
- c. Oval and Semi-Oval Paint and Varnish Brushes. These brushes are available in 2-1/2 in., 3 in., and 3-1/2 in. sizes and are suitable for general painting and varnishing. The oval brush is mainly for heavy duty finishing work. The semi-oval is used for fine painting and varnishing work. These brushes pick up and retain more paint or varnish than flat type brushes.
- d. Flat Varnish and Enameling Brushes. These brushes come in sizes from 1-1/2 in. to 4 in. They provide smooth application of varnish and enamel and are used for a wide variety of purposes.
- e. Flat and Angular Sash and Trim Brushes. These brushes are chiseled to provide the particular properties desired for trim and sash work. They come in sizes from 1 in. to 3 in. The angular brush is specifically designed for sash work and is suited for both paint and varnish.
- f. Oval Sash Brushes. These brushes are sometimes preferred over the flat sash brushes and they come in sizes from 1/2 in. to 1-3/8 in. They are good for paint application on moderately small surfaces, in corners and pockets, and for other irregular surfaces.
- g. Artist's Marking and Lettering Brushes. These brushes are usually made of softer bristles and are used for lettering and extremely fine work. They are available in very small sizes such as 1/16 in. up to 1-1/2 in.
- h. Flat Dusting Brushes. This type of brush is for brushing dirt and soot from surfaces to be painted.

4. Brushing Technique.

- a. The wrist and arm motions should be free, easy, and not forced. Hold the brush firmly with fingers. In holding the brush, the fingers should not go beyond the metal ferrule onto the bristles.
- b. Don't use a flat brush on its narrow edge. This causes the bristles to spread and wears the corners down, spoiling the shape and efficiency of the brush. An oval brush should not be permitted to turn in the hand, but should be held firmly. Rotation of an oval brush causes the bristles to wear into a pointed shape and become useless. Oversized brushes should not be poked or forced into areas too small for them.
- c. Before starting to paint, work the paint well into the brush. This is done by holding a mixing paddle across the top of the paint container, dipping the brush into the paint, then wiping the flat sides of the brush clean across the edge of the paddle. Do this several times to ensure filling the brush. Do not wipe the brush across the top edge of the paint can, as its curved surface will distort the shape of the brush.
- d. When painting, dip only half the bristles into the paint. Every brush has a certain capacity. Paint will drip and run off around the work if the brush is over-filled, particularly when working overhead.

- e. Hold the brush at right angles to the surface being painted with the end of the brush just touching the surface. Lift it clear of the surface before starting the return stroke. If the brush is held obliquely and is not lifted, the finished job will be uneven and it will show lap spots giving a "dabbed" appearance. A brush that is held at too great an angle (obliquely) will wear down at the ends. A properly used brush will wear evenly all around.
 - f. Since paint films tend to draw thin on corners and edges, coat these areas before applying the overall coat. Apply the overall coat immediately after this preliminary painting and without waiting for it to dry. These preliminary coatings of edges and corners are not counted as regular paint coats.
 - g. To avoid brush marks when finishing up an area, use strokes directed toward the last area finished, gradually lifting the brush near the end of a stroke while it is still in motion. Every time the brush touches the wet surface at the beginning of a stroke it leaves a mark, so always end up brushing toward the area already painted.
 - h. Always paint overheads first, then bulkheads, then decks. All drippings should be wiped up immediately. Drops of paint are too thick to dry properly and when painted over become unsightly soft spots in the finished coat.
 - i. Wait until the first coat is thoroughly dry before applying a second. It cannot dry properly if covered too soon.
 - j. The paint in the can must be stirred frequently while painting to prevent settling.
 - k. It is advisable to use brushes with nylon bristles in applying latex paints, as the nylon is resistant to the water and alkalis found in many latex paints.
5. Care of Brushes After Use. Depending on the paint and chemicals involved, it may be more economical to dispose of used brushes capable of being cleaned and reused rather than generate large amounts of paint slops that may qualify as hazardous wastes. Refer to Chapter 3.F. for hazardous waste determination. After weighing the disposal and liability costs involved, if reuse of a brush is determined to be appropriate, always clean the brush immediately after use. Use the thinner described for the paint in which the brush was used. Work the thinner well into the brush. Squeeze out as much thinner as possible, repeat the process two or three times, and rinse in clean thinner. Brushes used for epoxies should be cleaned immediately with special epoxy cleaner.
6. Striping. A craftsman-like job of applying stripes with a brush is easy to accomplish by either of two methods. Both involve the use of masking tape that can be easily removed without damage to the surface.
- a. The first method applies to surfaces that are finished and striping is the only painting to be done. Mark the position and width of the stripe and apply masking tape to both sides of the stripe. The striping color is then brushed on. When the paint has set, remove the masking tape.
 - b. The second method applies to surfaces that are to receive a complete paint job. Mark the position of the stripe and apply the striping color overlapping the boundary marks slightly. After the striped color has dried, apply masking tape to the exact area of the stripe. Apply the finish coat to the entire area. When dry, remove the masking tape to expose the stripe.
 - c. When removing masking tape from a surface, pull it off somewhat diagonally and back upon itself. Do not pull the tape directly away from the surface at right angles.

- G. Roller Application. Rollers constitute another satisfactory method for paint application and offer a great advantage in speed. They cannot be used in small hard-to-get-at areas and on irregular surfaces. Like brushes, use of disposable rollers eliminates the need for use and disposal of the great cumulative quantities of thinners used for cleaning. Whenever disposable rollers offer suitable application quality and are found to be cost effective, their use is preferred.

Roller Cover Materials. The cover is the main working part of a roller. There are several types and sizes. The standard size cover (for standard rollers) has a 1-1/2 in. inside diameter. "Nap" is the thickness of the cover and generally a thin nap is used on smooth surfaces and a thick nap is used on rough surfaces. Roller covers are usually available in 3/16 inch to 1-1/4 inch nap thickness. See Table 7-1. All the covers shown in Table 7-1 are applied to cores made of plastic, wood, wire and treated paper tubing. In quality covers, superior types of adhesives are used to bond the core and cover together so they remain intact when cleaned in the most rugged solvents, including lacquer thinners.

TABLE 7-1: Roller Selection Guide

Type of Paint	Type of Surface		
	Smooth	Semi-Smooth	Rough
Aluminum	C	A	A
Enamel or Semigloss (Alkyd)	A or B	A	-
Enamel undercoat	A or B	A	-
Epoxy coatings	B or D	D	D
<u>Exterior House Paint:</u>			
Latex for wood	C	A	-
Latex for masonry	A	A	A
Oil or alkyd - wood	C	A	-
Oil or alkyd - masonry	A	A	A
Floor enamel - all types	A or B	A	-
<u>Interior Wall Paint:</u>			
Alkyd or oil	A	A or D	A
Latex	A	A	A
Masonry sealer	B	A or D	A or D
Metal primers	A	A or D	-
Varnish - all types	A or B	-	-
<u>Roller Cover Key</u>			
	<u>Nap Length (inches)</u>		
A--Dynel (modified acrylic)	1/4-3/8	3/8-3/4	1-1 1/4
B--Mohair	3/16-1/4	-	-
C--Dacron polyester	1/4-3/8	1/2	-
D--Lamb's Wool	1/4-3/8	1/2-3/4	1-1 1/4
Notes:			
<u>Smooth Surface:</u> Hardboard, smooth metal, smooth plaster, drywall, etc. <u>Semi-Smooth Surface:</u> sand finished plaster and drywall, light stucco, blasted metal, semi-smooth masonry. <u>Rough Surface:</u> concrete or cinder block, brick, heavy stucco, wire fence. Comprehensive product standards do not exist in the paint roller industry. Roller covers vary significantly in performance between manufacturers and most manufacturers have more than one quality level in the same generic class. This table is based on field experience with first line products of one manufacturer.			

1. Mohair: Blends of wool, rayon, and mohair (Angora goat's wool) are considered mohair covers. This type cover is recommended for applying enamels to smooth surfaces.

2. Lamb's Wool: This is one of the original materials employed for roller covers, and is widely used. It maintains its resilience and carries a greater amount of paint than many other fabrics and is recommended in longer nap sizes for painting cyclone-type and other wire fences.
 3. Synthetic Covers: Fibers such as Dynel and Dacron are available for covers and can be generally used except for coatings containing alcohols and ketones.
- H. Spray Painting. Spray painting can save many hours of labor in comparison with brush painting, especially overheads and area with irregular surfaces. Spray painting equipment should be selected and updated to make sure nozzles, guns, lines, compressors, and motors are sized correctly for efficient operation.
1. Environmental Considerations. Spray painting operations require knowledge of and compliance with all federal, state and local requirements relating to the control of air pollution. Prior to starting spray painting operations, painting supervisors shall ensure their procedures comply with the law and obtain all necessary permits (including state and local permits). If possible, conduct spray painting inside a booth or prep station rather than an open bay. If a booth or prep station is used, ensure it is appropriately constructed and ventilated and workers use proper protection. For proper respiratory protection procedures, refer to Technical Guide: Practices for Respiratory Protection, COMDTINST M6260.2(series).
 2. Occupational Safety and Health Considerations. As discussed in Chapter Two, the risks related to atmospheric, health, and explosive hazards from a paint system are increased when application is made by spray painting. The principles of Operational Risk Management (ORM) to manage these risks should be applied before any paint operations begin, particularly so for spray painting operations. Contact the cognizant MLC(kse) for assistance.
 3. Types of Spray Equipment. Following are the most common types of spraying equipment that will be encountered:
 - a. Conventional Air Spray uses compressed air at pressures between 40 and 70 psi to atomize the paint at the nozzle of the gun and to feed the paint under pressure from the supply tank, pump, or cup to the gun nozzle. This type is the simplest and most versatile of spray systems for coatings with a wide range of viscosities. It normally requires an air temperature of at least 40°F for proper atomization; 70°F is optimum. Although conventional air spray generally produce the best quality finish of all spray methods, the larger amounts of air that are mixed with the coating during application cause a greater coating loss due to bounce-back or overspray. The transfer efficiency, the ratio of the actual coverage of a given amount of paint versus the theoretical coverage, is around 20-50% with conventional air spray. Conventional Hot Spray is a modified form of conventional air spray that uses the same equipment with the addition of a unit that heats the paint. This offers several benefits under certain operational conditions. With most organic paints that become less viscous at elevated temperatures, the hot spray system can apply higher solid content paints. This in turn produces greater film thickness and reduces the number of coats to achieve the desired film thickness. With heated paint, better atomization is accomplished with lower air pressure, and at the same time overspray is reduced. Hot spray also permits painting when atmospheric temperatures are well below the 70°F optimum for conventional spray.
 - b. HVLP (High Volume Low Pressure) Spray reduces the overspray problems encountered with conventional air spraying by atomizing the paint with a high volume of air at lower pressures (0.1 to 10 psi). Reducing the air pressure results in reduced bounce-back and increases the transfer efficiency to 55-70%. However, the drawbacks of HVLP spray are lower production rates and use limited to lower viscosity coatings.

- c. Airless Spray is created by forcing paint through a restricted orifice at very high pressure. Atomization of the paint occurs without the use of air jets (as with conventional and hot spray). Liquid pressures in excess of 1500 psi are developed in special high-pressure pumps. With a transfer efficiency of 40-70%, the airless system provides a very rapid means of covering large areas and surfaces with less overspray mist or rebound. The single small diameter hose line makes gun handling easy. Airless spray produces quick film build and is good for dried, absorbent and weathered surfaces.

WARNING

HIGH VELOCITY PAINT FROM AIRLESS SPRAY GUNS CAN PIERCE HUMAN FLESH AND RESULT IN DANGEROUS INFECTIONS.

- d. Plural Component Spray has become more common with the increased use of short pot-life/100% solids coatings. The individual components are mixed at the gun rather than being premixed in the pot. This reduces the waste associated with multi-component coating systems. Associated with plural component spray units are higher initial procurement costs and complexity of use that requires more experienced applicators.

4. Spray Paint Technique.

- a. Before starting to spray, all surfaces that are not to be painted must be masked. Large surfaces may be covered with drop cloths or a combination of heavy paper and masking tape. The lapping of masking tape onto bulkheads, when objects such as switch boxes are sprayed, will necessitate touch up by brush.
- b. Make sure the spray gun is thoroughly clean. Strain the paint through screen wire or cheese cloth as it is poured into the spray container. Air pressure to the gun should be adjusted to approximately 45 to 50 psi for lacquer and thin liquids and 60 to 70 psi for enamel. Initially, adjust fluid pressure (in a pressure feed gun) to 10 or 15 psi for lacquer and thin liquids and 15 to 20 psi for enamel.
- c. Nozzles providing a variety of fan widths are available. Some can be adjusted to vary the fan width while painting. Use gun manufacturers' guidance to select a nozzle that suits the coating material and the areas to be coated.
- d. A heavy centered pattern may be due to the spreader adjustment valve set too low, the fluid pressure too high, or the viscosity of the material too great.
- e. A split spray pattern may be due to spreader adjustment valve set too high, the fluid pressure too low, or the material being too thin.

NOTE: Adjusting spreader adjustment or fluid pressure will accomplish essentially the same thing: increase the pressure differential between air and fluid pressure. Lowering fluid pressure will decrease the rate of flow of the fluid thereby decreasing the rate of application. Increasing air pressure to the horn holes will increase the atomization rate. The choice of which adjustment to make will depend upon the rate of application desired. Follow the spray gun manufacturer's recommendation regarding type of thinner and its proportion in the spraying material when making adjustment.

- f. Another common defect in spray patterns is "Mist" or "Fog", due to air pressure too high or fluid pressure too low. Reducing the differential as for the split spray pattern above will eliminate the mist unless it is caused by improper use of the gun.

5. Paint Application.

- a. A good finished paint film depends as much on proper handling of the gun as it does on correct adjustments of the equipment. In general, hold the spray gun 6 to 8 inches away from the surface being painted. This is about the distance of a normal hand spread. Begin the stroke before the trigger is pulled and release the trigger before the end of the stroke. This prevents "piling up" paint at the beginning and end of each stroke. Always keep the gun at right angles to the surface. Never swing the stroke in an arch which would put too much paint in the center of the stroke and too little on the ends. The objective is to obtain adequate coverage with an even application and without runs and sags.
- b. Before applying the overall coat, spray small protruding parts such as hatch casings, door casings, rivet heads, and small built-in parts. This will ensure adequate coverage and will eliminate bridging and touching up later.
- c. When spraying corners, first spray up to within 1 to 2 inches of the corner. Then turn the gun on its side and hold the gun at an angle to the corner. Starting at the top, spray downward along the edge so both sides of the corners are sprayed at once.

6. Sprayed Film Defects. The most common defects in spray paint coating are "Orange Peel," Runs and Sags, Pinholes, Blushing, and Peeling.

- a. "Orange Peel" describes a painted surface that has dried with a pebbled texture. This may be caused by the use of improper thinners, insufficient atomization, holding the gun too far away from (or too close to) the surface, improper mixture of materials, or low humidity.
- b. Runs usually result from using material that is too thin. Sags result from too much material. They can also be caused by allowing too big a lap in spraying strokes and by poor adjustment of spray gun or pressure tank. Dirty or partially clogged passages for air or fluid will also cause uneven distribution.
- c. Pinholes may be caused by the presence of water or excessive thinner in the paint, or by too heavy an application of quick-drying paint. In either case, small bubbles form which break in drying, leaving small holes.
- d. Blushing resembles a powdering of the applied coating. The cellulose material in the lacquer separates from its solvent and returns to its original powder form. Water usually causes this and it may happen because of surface moisture or excessive moisture in the air. When blushing occurs, the entire defective area of the coating must be removed.
- e. Peeling is almost always due to careless workmanship in not cleaning the surface properly or incompatibility of paint films. Before any spraying is attempted the surface must be absolutely clean.

CHAPTER 9. CUTTERS AND BOATS GENERAL INFORMATION AND MAINTENANCE PAINTING

- A. When To Paint. Painting of cutter surfaces should be considered only when it is necessary to prevent corrosion or deterioration of the surfaces. Soiled surfaces should be cleaned rather than repainted.
1. Interior Surfaces. Interior surfaces are generally painted more frequently than necessary. Repainting too frequently results in paint film failure due to films which are too thick or incompatible. The interior paints that have been recommended are designed to hold up under repeated washing. Scrubbing the surface with detergent and water will usually result in a clean, fresh appearance. Interior repainting shall normally not be required more often than once every 3 years. The minimum number of coats required for hiding a surface should be applied. One coat is usually sufficient.
 2. Hull Exterior and Superstructure Surfaces. Exterior surfaces should be repainted prior to failure of the paint film. Exterior steel surfaces on cutters and boats above the main deck shall not normally be top coated more often than every two years. Exteriors of hulls above the boot-topping should not normally be top coated more often than every year. Touch-up painting rather than complete repainting should be considered. Units should refer to the Cutter Class Maintenance Plan (CCMP) for determining frequency of painting. For example, WMECs are now on an eight-year schedule for painting freeboard and superstructure.
 3. Underwater Body and Boot-Top Surfaces. Underwater body and boot-top surfaces shall be repainted at intervals prescribed by the MLC Commander under the guidance of the Commandant. The anticorrosion primer used with ablative paints should remain in place for the life of the paint (approximately 9-12 years). Do not remove the antifouling system if it is not necessary.
 4. Weather Deck Surfaces (Non-Flight Deck). The various non-skid/slip resistant systems used for weather decks should provide about 3-6 years of service. Cosmetic "wash" topcoats are allowed for broadcast grit and MIL-PRF-24667 non-skid systems, but shall not be used on slip resistant sheeting. Cosmetic "wash" topcoats should be used sparingly because they will have an adverse effect on the ability of the non-skid system to prevent slips and falls.
 5. Flight Deck Surfaces. Flight decks are certified by the Navy and must be applied and maintained in accordance with NSTM Chapter 634, Deck Coverings. Flight deck coatings shall be applied by commercial contractor, Coast Guard Yard, or USN Ship Intermediate Maintenance Activity (SIMA). An item to be determined on a pre-award survey is whether contractor personnel are competently trained and recognized by the manufacturer to ensure that the non-skid is applied according to coating manufacturer's instructions and that the manufacturer will honor the warranty. Contracts may specify a warranty by the contractor but care should also be taken to preserve any standard warranty provided by the manufacturer. In lieu of top coating, decks shall be washed using Adhesion Promoter/Cleaner to remove stains, chalking and residual oil (Note: Federal Law prohibits units from allowing any cleaning solvents to enter the sea within 12nm of shore). Ship's work force is authorized to spot repair flight decks in order to control underlying corrosion in accordance with the guidelines set out in NSTM 634, Deck Coverings. Ships are also encouraged to review MLCA's Flight Deck Preservation Web-Based Interactive Tutorial, located on the MLCA Naval Engineering Website.
- B. Changing Painting Practices. CG policy requires products which meet minimum technical needs and which have the lowest potential for injuring personnel and causing environmental damage. In the past, CG policy required the use of Federal and Military specifications when available. Coatings selected for this Manual still include specifications developed by other federal agencies, primarily the Naval Sea

Systems Command (NAVSEA), in order to avoid duplicating costly R&D work. However, there is a much greater reliance on commercially developed products. Before being entered in the manual, all coatings and systems are reviewed technically to determine suitability for CG use. Projects have been established to test and develop new coatings when specifications do not meet minimum technical needs. Lists of Coast Guard approved commercial products that meet minimum technical needs have been issued in this Manual as required to meet CG requirements. Coatings and painting practices are changing rapidly in response to environmental laws and occupational health concerns. Changes will continue to occur at a rapid rate during the next decade.

Prototypes of any new material requires prior approval by the Commandant (G-SEN), which has delegated this authority to ELC(01). Units wishing to test new coating systems or materials shall submit prototype requests to ELC(01) via their cognizant MLC(v); copy to Commandant (G-SEN), ELC (024), non-cognizant MLC(v), and, if appropriate, Acquisition Program Manager. Letter reports of performance data will be described in the approval document.

C. Vessel Maintenance Painting.

1. Touch-Up Painting On Steel. Any of the surface preparation methods discussed in Chapter 5 of this Manual may be used for steel surfaces. Choice of method should be based on equipment availability, manpower skills, total area being worked, and accessibility. Use the same primer as the original application. Apply in accordance with manufacturer instructions. One exception is inorganic zinc primers because they usually require a Near-White Blast Cleaning (SSPC-SP 10) which is generally beyond the capabilities of the ship's force.
2. Touch-Up Painting On Aluminum. Abrasive blasting aluminum and aggressive disk sanding down to bare metal are not encouraged because these methods remove too much metal from the hull. Loose paint should be scraped off. Rough edges should be feathered out and the original primer and remaining paint should be top coated. Exposed aluminum should be reprimed with the same primer as the original application. Apply in accordance with manufacturer instructions.
3. Alternative Primers. Table 9-1 provides alternative primer systems for the ship's work force to use for touch-up maintenance work if the high build epoxy primers called out by this Manual are not available. The primers are selected because they have been frequently used in the past, are readily available, and have low hazardous pigment concentrations. The tables found elsewhere in this Manual should be used to determine correct topcoat and color.

TABLE 9-1
Alternative Maintenance Primers for Steel and Aluminum Vessels

Touch up Area	Preparation	Coating (Brush or Roller)	Rating
Interior Dry Areas w/o Corrosion	Hand Tool Cleaning or Power Tool	1 coat Zinc Molybdate Alkyd Primer TT-P-645	Very Good
Exterior Problems (For vessels operating in fresh or salt water)	Cleaning	2 coats Zinc Molybdate Alkyd Primer TT-P-645	Good
Exterior/Interior Wet Areas with Corrosion Problem (For vessels operating in salt water)	Power Tool Cleaning Near White Metal	2 coats Epoxy Polyamide Primer, Formula 150 MIL-P-24441 Type III or IV	Excellent
Appearance	Power Tool Cleaning	2 coats Zinc Molybdate Alkyd Primer TT-P-645	Fair

- D. Critical Coated Surfaces. Critical coated surfaces are those areas that have experienced premature failures in the past that have resulted in avoidable repair costs. Coatings specifications address these critical areas by requiring greater degrees of cleanliness, inspection, and quality control. Critical coated surfaces are defined as all exterior applications (including but not limited to the underwater body, freeboard, weather deck, flight deck, superstructure, and mast), bilges, and tanks/voids (including but not limited to ballast, potable water, and fuel).
- E. Rust Converters and Stabilizers. Continued challenges surrounding internal corrosion within tanks, bilges, voids, and inaccessible areas require innovative alternatives. In many cases, rust converters, stabilizers, and iron phosphate coatings, such as RDP Rust Deoxidizing Primer, offer an effective and environmentally sound method of protecting steel structures. Use of rust converters, stabilizers, and iron phosphate coatings is highly encouraged. Adding this option to a unit's materiel maintenance program can reduce metal wastage caused by unchecked corrosion and also reduce the manpower effort required to eliminate corrosion if a coating system fails. However, it should be noted that these products do not provide for as long term performance as surfaces prepared in accordance with Chapter 5 of this Manual. The iron phosphate solutions deoxidize rusted metal, removing the rust "stain" and prevent continued oxidation for up to 90 days. Repeated applications on treated steel will stop or slow the corrosion process, during the interim period, until a new coating system is applied. When using rust converters, stabilizers and iron phosphate coatings, units shall conduct an evaluation of the product with full concern for state and local environmental regulations and hazardous materials concerns. Assistance in this evaluation is available from the cognizant CEU or MLC (vs). Additionally, units shall set up adequate ventilation if using a rust converter or stabilizer in a confined space. Rust converters and stabilizers are only for use at the unit level and are not authorized for use by industrial level activities. Rust converters are not authorized for use on flight deck surfaces.
- F. Preconstruction Primers. Also known as shop primers, preconstruction primers are used as a temporary coating to protect steel from corrosion during welding, storage, and fabrication. Preconstruction primers shall be removed prior to applying the permanent coating system on all critical coated surfaces as defined in section 9.D. Preconstruction primers may be left in place in other interior areas (such as machinery spaces, habitability spaces, etc.) if they are intact, uncontaminated, and compatible with the overcoating system.
- G. Powder Coatings. Powder coating is authorized for use on exterior topside or interior applications where traditional liquid applied coating systems are difficult to maintain due to a severely corrosive environment, high wear, or abrasion. These coatings are usually applied by electrostatic spray or fluidized bed. The final step in the process involves heating in an oven at temperatures from 275°F to 450°F. The need for an oven limits the application to items that can be removed from the cutter or boat, withstand the high cure temperatures, and sizes that can be fitted in the available oven. The powder that is used should conform to the requirements of MIL-PRF-24712 with Type IV Polyester TGIC recommended for exterior applications and Type I Epoxy for interior applications. Following is a sample list of items that are candidates for the application of powder coatings.
- H. Stripe Coats. Stripe Coating refers to the practice of applying an extra layer of paint on areas such as corners, edges and welds. (It is not to be confused with the method of painting stripes, "striping", discussed in Chapter 7.) Stripe coating will build up the coating thickness at edges where paint tends to shrink away from the edge surface. It also fills in surface irregularities such as porosity in welds. Stripe coats shall be applied after the application of the primer coat. Use the same coating for the stripe coat as was used for the primer coat. Stripe Coating is a proven method for increasing the useful life of a coating system. It is required for all critical areas as defined in section 9.D.

TABLE 9-2
Candidate Powder Coating Applications

Anchors	Fire Hose Racks, Fire Extinguisher Holders	Overhead Panels
Battle Helmets	First Aid Boxes	Padeyes
Boat Booms	Foundations: AFFF/PKP	Perforated Plates for Hull Openings and Tank Entries
Brackets	Fuel Oil Spill Kit Boxes	Piping, Interior/Exterior
Bunks and Fixtures	Furniture: File Cabinets	Sea Chest Strainers
Chains: Safety, Anchor/Links	Gun Mounts and Hardware	Sea Transfer Equipment
Chocks	Hand Railings	Ship's Communication Speaker Boxes
Control Panels	Hatches	Signaling Equipment
Damage Control Equipment: Flashlight Holders, Battle Lanterns	Head Facilities: Medicine Cabinets, Towel Racks, Partitions, Doors, Blow Dryers	Signs: Refueling, Damage Control, Medical, Directional
Deck Gratings	Instrument Consoles	Sound Powered Telephone Receiver Holders
Deck Hardware: Refueling Gear, Portable Booms, Underway Replenishment Equipment	Junction Boxes	Spare Parts Stored In Free Floods
Deck Light Covers and Deflectors	Ladders: Interior/Exterior, Railing and Related Hardware	Stanchions
Diesel Motor Covers	Lantern Mounts	Stretchers, Strokes
Doors: Watertight and Partition	Light Fixtures: Interior/Exterior	Swimmer's Safety Line Reels and Bases
Drip Pans	Line Reels and Cable Reels	Tank Covers
Electrical Cabinets	Lockers: Ammunition, Pyrotechnic, Clothing	Tool Boxes
Electrical Motor Housings	Lube Oil Strainers	Ventilation: Fixed Sectional and Screens
Exterior Turnbuckles (Lifeline)	Mess Deck Furniture	Weapons Handling Equipment
Fasteners	Metal Shoring	

CHAPTER 10. CUTTERS AND BOATS SAFETY COLORS AND MARKINGS

- A. Colors For Safety. The Coast Guard uses two different color-marking systems. The Coast Guard safety color code for marking physical hazards on cutters and boats is in accordance with the standards set forth in Title 29, Chapter XVII, Part 1910, Subpart J, paragraph 1910.144, of "Occupational Safety and Health Standards" (Federal Register, Vol. 39, No. 125). In addition, Coast Guard cutters larger than 75' are marked with the Navy photoluminescent system from NSTM Chapter 079 to facilitate emergency exit and damage control during a lights out power loss. The Navy photoluminescent system is not the CG "safety marking system". These two systems are presented in separate sections in this chapter to emphasize their differences. Where the Navy system is applied to safety related items on the ship, it is not considered necessary to mark items a second time to conform to 29 CFR.
- B. The Coast Guard "Safety Marking System" according to 29 CFR.
1. Red for Fire Protection. Red (11105) is standard for the identification of damage control and fire protection equipment. It shall be used for fireplugs, fire alarm boxes, fire main valves, flooding valves on dry-docks, transmitting antenna hardware and sprinkler lines (with the exception of magazine sprinkler lines). In painting fire main valves, the valve body, bonnet and handle shall be painted. Valve stems and threads on the valve body shall not be painted.
 - a. Panels of red (11105) shall be painted behind fire fighting equipment on walls and columns.
 - b. Extinguishers should not be painted a color that differs from the color supplied by the manufacturer. However, if they are painted, care must be taken to ensure that use and hydrostatic test data are not obliterated. Hydrostatic test data shall be marked on extinguisher bodies in accordance with NFPA No. 10, paragraph 5-6.4. NFPA No. 10 can be obtained from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269.
 - c. Safety cans or other portable containers of flammable liquids having a flash point at or below 80°F, excluding shipping containers, shall be painted red (11105). The name of the liquid shall be conspicuously stenciled or painted on the can in yellow along with the word FLAMMABLE. Fifty five-gallon drums are not considered portable and are therefore painted yellow (13538) with black lettering.
 - d. Fire axes are painted red (11105). The areas three quarters of an inch from the cutting edge and one and one quarter of an inch from the tip of the head are not painted and the handle is not painted except for the last six inches from the end. Preserve the unpainted metal and wood with varnish.
 - e. Emergency stop bars or buttons on machines shall be painted red.
 - f. Electrical circuit breakers or switches that are used for emergency shutdown of equipment or electrical service shall be painted red. The equipment or service controlled and the applicable voltages will be stenciled (or otherwise marked) in yellow (13538) on the base of the breaker box if the equipment it controls is not otherwise evident.
 - g. To relate extinguisher types to classes of fire, further symbols and color designations are recommended. Extinguishers suitable for more than one class of fire should be identified by multiple symbols placed in a horizontal sequence.
 - (1) For Class A fires (wood, paper, rubbish, deep-seated fires), the symbol is a green triangle containing the letter A in white. An applicable extinguisher is a multipurpose dry chemical.

- (2) For Class B fires (oil, gasoline and other flammable liquids which do not mix with water), the symbol is a red square containing the letter B in white. Applicable extinguishers are carbon dioxide and dry chemical.
 - (3) For Class C fires (electrical equipment), the symbol is a blue circle containing the letter C in white. Applicable extinguishers are carbon dioxide and dry chemical.
 - (4) For Class D fires (metal), the symbol is a yellow five-pointed star containing the letter D in black. Fire of high intensity may occur in metals such as titanium, magnesium, zirconium, sodium, potassium, etc. Ignition is usually the result of friction (grinding), exposure to fire or high heat, and in some cases exposure to moisture. Normal extinguishing agents should not be used for Class D fires. Approved extinguishing agents are available in dry powder form that may be applied with a scoop or shovel or by means of an extinguisher designed for dry powders.
2. Yellow For Hazard Marking. Yellow (13538) is the accepted color used to paint striking, stumbling, and falling hazards. Where suitable, alternate bands of black and yellow shall be used. Thus, yellow (or black and yellow) shall be applied to low overhead hazards, guard railings, the edges of platforms and pits, crane beams, pulleys, blocks, skids, hand trucks, and the bottom panel (or lower 12 in.) of rollup doors and moldings, holding the door track to a height of 5 ft. (inside and out).
- a. On stairways, yellow (13538) shall be applied in 4 in. bands immediately under the tread on top and bottom risers. Yellow markings are not required on ladders, inclined ladders and stairways without risers. Yellow shall also be used to mark the emergency gate which connects tanks in dry-docks.
 - b. Drums and storage tanks containing flammable liquids and gasoline-powered equipment shall be painted yellow (13538). Aerial-Floatable Drop Pump Canisters (AFDPC) shall be painted international orange (12197).
3. Orange For Hazard Marking. International orange (12197) is standard for hazards that are likely to cut, crush, burn, or shock personnel. It shall be applied on or near dangerous parts: gears, shears, planers, brakes, rolling and crushing devices, forming presses, punch presses, and riveting machines. It is desirable to use orange on the under side of guards over belts or gears in order to signal against carelessness by exposing a gaudy color to the eye. The exteriors of such guards shall be gray.
- a. It shall be used for guards around hot pipes, exposed electrical wires and connections.
 - b. Overhead electric wires or rails for conveying and hoisting equipment should be conspicuously marked with orange on adjacent beams, covers or supports. The inside of switch and fuse box doors and covers are painted orange to reveal a vivid color and encourage the proper closing of panel doors at all times.
4. Blue For Electrical Equipment.
- a. Blue (15123) shall be used in industrial areas for switch and fuse box control panels and off-and-on control boxes on machinery. In personnel facilities and offices, electrical control panels may be in the wall color. In all instances the inside areas of such boxes should be colored Orange (12197) using paint or colored decals. Emergency shutdown and main circuit breakers or switches shall be painted red in accordance with this chapter.
 - b. Blue is also applicable to electrical control mechanisms, receiving antenna hardware, electric shore tie connections, welding gear, the control boxes of hoists, winches, and cranes.

5. Green For First Aid. Green (14260) shall be used for the identification of first aid equipment. It shall be painted on first aid and medicine cabinets, stretcher boxes, cabinets for gas masks, safety showers, and for all signs relating to first aid and safety. Green is also used for discharge valves on dry-docks.
6. Purple For Radiation Hazards. Ample protection must be provided against exposure to nuclear radiation hazards. Such radiation, associated with radioactive isotopes, chemicals, and fissionable materials, is invisible but may lead to severe injury. The storage, packing, and handling of radioactive chemicals are stringently controlled by the United States Department of Energy. To safeguard personnel, the radiation symbol shall be applied in all facilities where radiation hazards exist.
 - a. Radiation areas and hazards shall be marked in accordance with the Code of Federal Regulations (CFR) Title 10, Part 20, paragraphs 20.202 through 20.204. The three-bladed, propeller shaped radiation symbol shall be purple (27142) on a background of yellow (23538). The CFR permits either magenta or purple for the symbol. Consequently, when the symbol is furnished by others, it may be either color.
 - b. Special tags and labels shall be attached to all containers, receptacles, storage areas, or rooms, in order to caution against handling or entry. For further protection, the specific type of hazard should be described with any special instructions. Where necessary, special cautions to be observed can be lettered on or immediately adjacent to the radiation caution symbol.
7. Aisle Marks. It is good practice to use aisle marks and lines to indicate safety aisles and storage areas. White marks and lines shall be used where floors are dark, and black where floors are light. Lines and marks around hazards or along pit and platform edges shall be yellow (13538).
8. Safety Helmets. Safety helmets (hard hats) are required at all Coast Guard Units to provide protection against injuries caused by falling and swinging objects, and electrical shock. The color of the safety helmets and corresponding work assignments are shown in Table 10-1. Safety helmets should not be painted.

TABLE 10-1
Color for Safety Helmets

<u>COLOR</u>	<u>ASSIGNMENT</u>
WHITE	Officers/CPOs/Safety Observer
YELLOW	Rig captain/Deck Supervisor
GREEN	Signalmen/phone talkers
BROWN	Winch and Boom Operators
RED	Line-throwing gunners (or line heavers)
WHITE (with red cross)	Corpsman
BLUE	Deck riggers/line handlers
ORANGE	Supply personnel
GRAY	All others/Deck Workers

C. Use of the Navy Damage Control Marking System.

1. General.

- a. The information in this section is based on the Naval Ship's Technical Manual, Chapter 079, VOL II. In cases where information in the Coatings and Color Manual and the NSTM conflict, the Coatings and Color Manual shall take precedence.
- b. Damage control markings may be retro-reflective, photoluminescent or a combination of both, depending on the marking's purpose.
- c. The provisions of this Manual are minimum requirements. Cutter COs and OICs may authorize additional markings and/or those larger than required if a greater degree of safety is desired.
- d. Location requirements are intended to meet the majority of the cutter's needs. Some ship configurations may not allow strict conformance to policy and in these instances locations shall be chosen that: (1) are as near as practicable to required locations; (2) are as visible as possible; and (3) are situated so as to receive maximum excitation lighting.
- e. Cutter COs and OICs may use smaller markings when ship configurations do not allow minimum size requirements to be met. In doing so, only that size reduction necessary to meet ship configuration is authorized. Concurrently, where "suitable sized photoluminescent background" is specified, cutter COs and OICs shall require background sizes which provide for suitable visibility to meet the safety considerations of their crews.
- f. Photoluminescent materials shall not be placed where they may violate material condition Dog Zebra (i.e., be visible from the exterior of the vessel).
- g. Photoluminescent materials shall not be installed inside the bridge/pilothouse or other ship control stations where night vision is a necessity.
- h. Photoluminescent paints, self-adhesive stickers/tape, pre-fabricated signs, etc., are currently available from both the stock system and from commercial sources. In selecting products, flexibility is encouraged, including unit or locally fabricated markings. However, only those photoluminescent materials possessing the following "light generating characteristics", after excitation, as per FED-SPEC-A-A-50598, Kit, Photoluminescent Marking, may be utilized:
 - (1) 20 microlamberts after 2 minutes.
 - (2) .4 microlamberts after 30 minutes.
 - (3) .1 microlamberts after 2 hours.
 - (4) .04 microlamberts after 4 hours.
 - (5) .01 microlamberts after 8 hours.
- i. Retroreflective materials (such as used on PFDs, liferings, etc.) shall NOT be used to satisfy marking requirements unless otherwise specified in this chapter.
- j. Equipment normally stowed inside repair lockers shall not be marked.
- k. This chapter does not require the use of photoluminescent materials in all cases. Photoluminescent marking requirements are specifically denoted by **bold** type where required.

2. Damage Control Marking Requirements for Cutters.

a. Compartment Bull's Eye (Interior).

- (1) Compartment bull's eyes are to be applied in each space or compartment to identify the space, setting forth the frames which bound the space and the division responsible. An example is shown in Figure 10-1.
- (2) A bull's eye should be visible from each access to the space.
- (3) Lettering will be two-inches in height applied over a 12-inch high by 15-inch wide photoluminescent label or yellow painted area.
- (4) For photoluminescent adhesive material, use blue retro-reflective lettering, two inches high. For painted bull's eyes, use black lettering, two inches high.

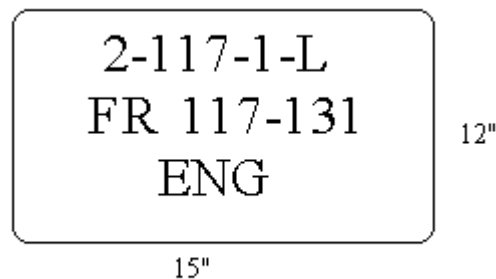


Figure 10-1 Compartment Bulls-Eye

- b. Aqueous Potassium Carbonate (APC) Extinguishing Systems. APC systems shall be marked with "APC" in 1 inch red letters on a suitable sized white background located as near as practicable to the actuating device(s).
- c. Portable CO₂, Halon, PKP, and AFFF Extinguishers and Hose Reels. The bulkhead directly above these extinguishers and hose reel actuators shall be marked with "CO₂", "HALON", "PKP", or "AFFF", as appropriate, in 3 inch red letters on a suitable sized **photoluminescent** background.
- d. OBA Storage Cabinets. All sides of these cabinets normally visible shall be marked with "OBA" in 3 inch red letters on a suitable sized **photoluminescent** background.
- e. OBA Canister Stowage Cabinets. All sides of these cabinets normally visible shall be marked with "OBA" in 3 inch red letters over "CANNISTER" in 1 inch red letters on a suitable sized **photoluminescent** background.
- f. Compartment Frame Markings. Frame numbers preceded by the letters "FR" shall be marked at least once in each compartment and shall be in 2 inch letters of a color contrasting

with the bulkhead. Markings shall be placed at eye level or higher. In compartments over 24 feet in fore/aft length, these markings shall be applied once every 24 feet.

- g. Battle Dressing Station (BDS) Directional Arrows. On cutters 180 feet and over, these signs shall be applied on bulkheads in each space over 15 feet in length and on the bulkheads of all passageways indicating the principal route to the nearest BDS. In passageways over 15 feet in length, the markers are to be placed every 15 feet or less depending on the configuration of the passageway. See Figure 10-1 for specific sign configuration.

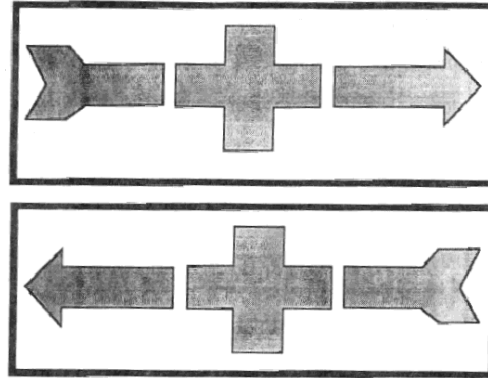


Figure 10-2; Battle Dressing Station (BDS)
Directional Markers

- (1) Arrows shall be red, no smaller than 1 inch in height, and no smaller than 12 inches in length.
 - (2) Crosses shall be red, no smaller than 4 inches in height and width.
 - (3) The arrows and crosses shall have a 1/8 inch black border on a plain white background for exterior use and on a **photoluminescent** background for interior use.
 - (4) On the interior surfaces of the cutter, the signs shall be placed not less than 12 inches and no higher than 36 inches above the deck. On exterior surfaces, signs shall be placed approximately 60 inches above the deck.
 - (5) When displayed in conjunction with Exit and/or Decon Station routing markers, the signs shall be stacked above one another with the BDS sign topmost and the Exit sign nearest the deck.
 - (6) Signs applied to the interior of the cutter shall be **photoluminescent** in case of lighting failure, however, placement of photoluminescent signs shall not violate the provisions of sections 10.B.1.e and 10.B.1.f.
- h. Decontamination Station Directional Markings: On cutters equipped with CBR equipment, these signs shall be applied approximately 60 inches above the deck on the external surfaces of the cutter indicating the principal and most direct route to the closest decontamination station. Entrance signs shall be placed at the entrance door to each station. Exit signs shall be installed

on the shower side of each exit door from each station. See Figure 10-3 for specific sign configuration.

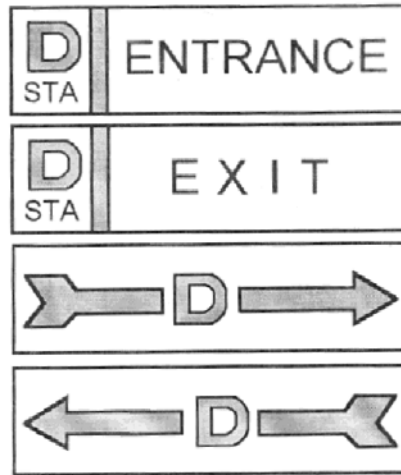


Figure 10-3; Decontamination Entrance, Exit and Route Signs

- (1) Decontamination station entrance, exit, and route signs shall be no less than 12 inches in length, and no less than 3-1/2 inches in height.
 - (2) The "D" shall be no less than 3 inches in height, shall be green in color and be bordered inside and out with a black 1/8 inch border.
 - (3) The arrows on the route markers shall be green, no less than 1 inch in height and bordered by a 1/8 inch black border.
 - (4) The "STA" on the entrance and exit signs shall be no less than 1/2 inch in height and shall be black.
 - (5) The divider between the "D" on the entrance and exit sign shall be black in color and 3/8 inch wide.
 - (6) The "ENTRANCE" and "EXIT" shall be no less than 2 inches in height and shall be black in color.
- i. Interior And Exterior Fire Stations/Plugs. The bulkhead immediately above all fire stations shall be marked with 1 in. white letters on a suitable sized red background as per Figure 10-4. In lieu of the aforementioned marking scheme, interior bulkheads may be marked with 1 inch red retro-reflective lettering with a suitable sized photoluminescent background. However, exterior bulkheads shall not be marked with photoluminescence.

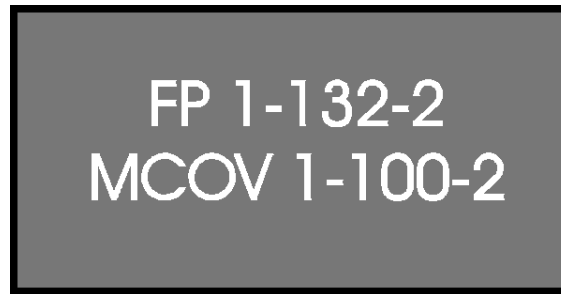


Figure 10-4; Fire Stations/Plugs

- (1) The background shall be of a suitable size and red in color.
- (2) The lettering shall be made of one inch white letters.
- j. Fire Station Cutout Valve Locations. The actual cutout valve location shall be marked with "COV" followed by the valve number in red 1 inch letters/numbers on a suitable sized **photoluminescent** background. In those instances where the valve is not normally visible (such as behind a false overhead panel), the marking shall be placed on the panel itself and shall be located within 12 inches of the valve(s).
- k. Zebra Classified Firemain Segregation Valves. These valves shall be marked with "COV" in red 1 inch letters followed by the 2 inch red letter "Z" followed by the valve number in red 1 inch numbers. These markings shall be on a suitable sized **photoluminescent** background and shall be located within 12 inches of the valve(s)
- l. Fixed Fire Extinguishing Systems. All fixed system actuating points/devices shall be marked with the letters "AFFF", "HALON", or "CO2" as applicable in red 1 inch letters on a suitable sized **photoluminescent** background and shall be located within 12 inches.

3. Marking Requirements for Egress Routes, Fittings, and Equipment.

- a. Exit Signs/Arrows. In those compartments with a length or width of 30 feet or greater, **photoluminescent** exit signs shall be placed on bulkheads of passageways every 15 feet along the "primary" egress route only. No "double directional" signs shall be used. The signs shall be located no lower than 12 inches and no higher than 36 inches above the deck. When used in conjunction with Battle Dressing Station routing markers, the signs shall be stacked one above the other with the Exit sign nearest the deck and the BDS sign topmost. Placement of photoluminescent signs shall not violate provisions of 10.B.1.e and 10.B.1.f of this Manual. Photoluminescent signs/materials shall be in accordance with 10.B.1.g of this Manual. See figure 10-5 for exit sign configuration.

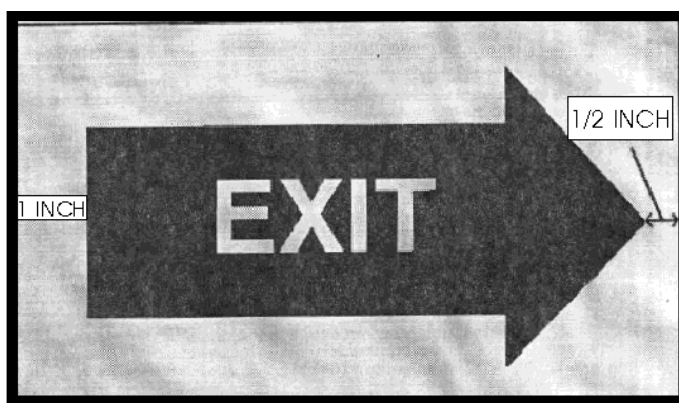


Figure 10-5; Exit Sign

- (1) The exit sign background shall be made of photoluminescent material 6 inches in height and 8 inches in length.
 - (2) The arrow shall be black in color, approximately 6 inches in length and 3 inches in height. The arrow shall be placed on the background as shown in Figure 10-4.
 - (3) The word EXIT shall be made of 1 1/2 inch or 2 inch photoluminescent material.
 - (4) Exit signs/arrows are both right and left-handed. The arrow in Figure 10-4 is a right-handed directional arrow.
- b. Doors And Scuttles: The outline of doors along primary egress routes shall be marked with a 2-inch border of **photoluminescent** material. Doors opening to the weather decks shall have the frame vice the door outlined. Scuttles with folding/roll up ladders and all access fittings leading out of machinery spaces shall be so marked. See figures 10-6 and 10-7 for examples.

Typical Photolum Material Markings
Around Door Frame

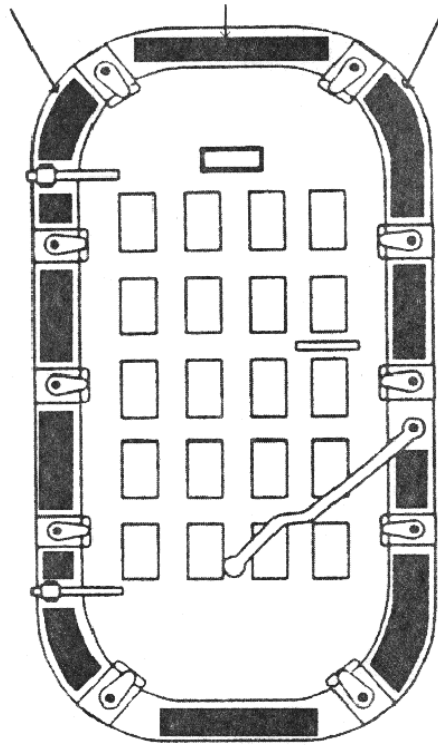


Figure 10-6; Typical Photoluminescent
Material Markings Around a Door
Frame

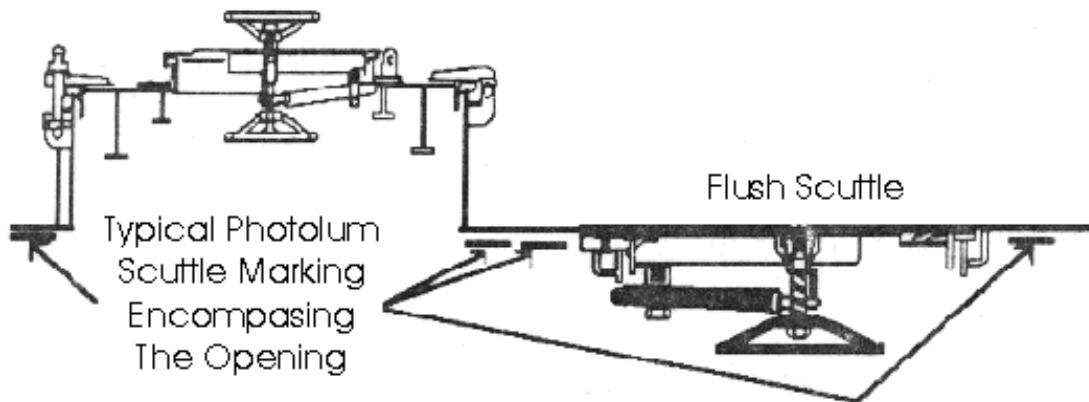


Figure 10-7; Typical Scuttle Photoluminescent Markings

- c. Kickout Panels. On doors with kickout panels, the panel shall be outlined with 1-inch **photoluminescent** materials. The panels shall only be marked on one side of the door to reflect egress route identification.

- d. Vertical Ladders. The lower half of the ladders shall be marked with a 1 inch strip of **photoluminescent** material around the outboard edges of each ladder rung. See figure 10-8 for examples.

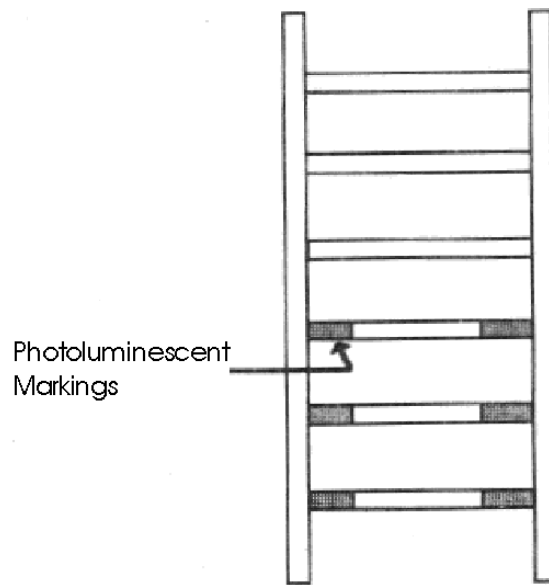
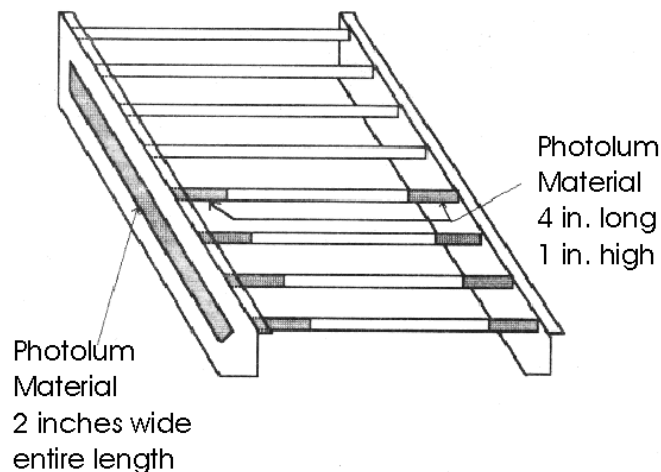


Figure 10-8; Typical Vertical Ladder Photoluminescent Markings

- e. Inclined Ladders. The lower half of the ladders shall be marked with **photoluminescent** materials as follows; a 4 inch by 1 inch strip shall be placed on the outer side of the facing edge of each step and a 2 inch strip shall be placed on the outboard facing side of each ladder rail. See figure 10-9 for examples.

Figure 10-9; Typical Ladder Photoluminescent Markings



CHAPTER 11. CUTTERS AND BOATS COLORS - EXTERIOR AND INTERIOR

- A. General. This chapter presents the required colors for various exterior and interior areas/components of Coast Guard cutters and boats. The areas are listed in alphabetical order. The specified coating systems and requisition information are found in Appendices A through C. The cognizant MLC promulgated cutter or boat painting schedules take precedence over this chapter. In general, miscellaneous exterior objects whose colors are not specifically prescribed in the following paragraphs shall be painted the same color as the structures to which they are attached or adjacent. References are by paragraph heading and include:

1. Exterior Spaces.

- a. Anchors, Anchor Chains. (pg. 11-1)
- b. Antenna Hardware, Radio and Radar, DF Loops. (pg. 11-2)
- c. Boot-Top. (See Underwater Body/Boot-Top). (pg. 11-2)
- d. Electric Cables, Armored, Exterior. (pg. 11-2)
- e. Flight Deck. (pg. 11-2)
- f. Freeboard. (pg. 11-2)
- g. Machinery, Deck. (pg. 11-3)
- h. Masts. (pg. 11-3)
- i. Miscellaneous Details and Fittings. (pg. 11-4)
- j. Open Hulls, Cockpits and Cargo Space. (pg. 11-6)
- k. Ordnance Equipment. (pg. 11-6)
- l. Piping Systems. (pg. 11-7)
- m. Running Light Screens. (pg. 11-7)
- n. Smoke Stacks. (pg. 11-7)
- o. Spuds. (pg. 11-7)
- p. Superstructure. (pg. 11-7)
- q. Underwater Body/Boot-Top. (pg. 11-7)
- r. Weather Decks. (pg. 11-8)

2. Interior Spaces.

- a. Interior Colors - Epoxy. (pg. 11-9)
- b. Interior Colors - Fire Retardant Paint. (pg. 11-9)
- c. Piping Systems. (pg. 11-10)
- d. Miscellaneous Interior Spaces. (pg. 11-11)

- B. Exterior Spaces. **Revision B to this manual changed the exterior white from Fed. Std. 595 color number 17875, which has a slight gray tinge, to color number 17925, which is a "pure" white.** Transition shall be driven by maintenance and supply considerations. No funding is being provided to effect this change. Units may exhaust their inventory of color #17875 prior to transitioning to color #17925. No timeline for transition is imposed, CO's discretion in accomplishing this change shall prevail.

- 1. Anchors, Anchor Chains. (See Appendix A, Anchors and Anchor Chain) Anchors stowed in the hawse shall be the color of the hull; white (17925), black (17038) or red (11105). Anchors stowed against the superstructure shall be, white (17925). Anchors stowed on deck shall be spar (10371). Anchor chain will be painted black (17038) with the exception of the depth markings. The detachable link between shots, excluding the detachable link for the 5 fathom connecting section, will be painted in the following pattern starting at the anchor end and working inboard, repeating the pattern as necessary:

15 fathom, first shot detachable link, red (11105)
30 fathom, second shot detachable link, white (17925)
45 fathom, third shot detachable link, blue (15182)

- a. Additionally, the first link on each side of the 15 fathom detachable link shall be painted white (17925). The first link at each side of the detachable link shall also be marked by one turn of wire around the stud. The first two links on each side of the 30 fathom (second shot) detachable link shall be painted white (17925). The second link at each side of the detachable link shall also be marked by two turns of wire around the stud.
 - b. The same pattern of marking detachable links shall be continued up to the next to last inboard shot. All of the links in the next to last inboard shot shall be painted yellow (13538), and all of the links in the last inboard shot shall be painted red (11105).
2. Antenna Hardware, Radio and Radar, DF Loops. Do not paint radar waveguides, gaskets, contact points, insulators or rubber stock mounts. Wire or whip antennas may be painted white or black to enhance appearance of the cutter or boat. Top coat the antenna with a commercial grade of acrylic paint. Four inch wide red (11105) warning lines shall be painted on the deck to designate Radio Frequency Radiation Hazard Areas. Location of the warning lines will be found in a modification to the ship's drawings. Warning signs shall be posted where personnel enter the hazardous areas. Further guidance can be found in Electronics Manual, COMDTINST M10550.25(series). Antennas are not to be painted with metallic based paints. If unsure, do not paint and refer painting maintenance to the supporting electronics facility.

TABLE 11-1: Antenna Hardware Colors

Hardware	Color
Direction Finder Stand and Loops	White (17925)
Radar	Match Mast Color
Whip Antennas	White (17925)
Antenna base (receive)	Blue (15182)
Antenna base (transmit)	Red (11105)
NOTE: Radio antennas may be painted black for aesthetic reasons. The manufacturers recommended coating should be used for this purpose. Usually, the recommended coating is a water based acrylic. Coatings with metallic pigment shall not be used on antennas.	

3. Boot-Top. (See Underwater Body/Boot-Top).
4. Electric Cables, Armored, Exterior. Paint in the color of the structure to which the cable is attached. Do not paint identification labels.
5. Flight Deck. All vessels with helicopter flight decks shall follow the instruction set forth in The Shipboard Helicopter Operational Procedures Manual, COMDTINST M3710.2 (series), Chapter 4, for proper marking and identification of this area.
6. Freeboard (See Table 11-2: Underwater Body, Boot-top, and Freeboard Colors). The freeboard coating system shall extend from the upper limit of the boot-topping, antifouling or underwater area to the top of the hull, bulwark, or sheer line, including all fittings.

TABLE 11-2: Underwater Body, Boot-top, and Freeboard Colors

Vessel Class	U/W Body *	Boot Top *	Freeboard
14' Skiffs - ops on ice	Int'l Orange (12197)	Int'l Orange (12197)	Int'l Orange (12197)
ASB	Red (11105)	Black (17038)	Black (17038)
Barges	Red (11105)	Black (17038)	Black (17038)
Buoy Boats	Red (11105)	Black (17038)	Black (17038)
Flood Relief Punts	Int'l Orange (12197)	Int'l Orange (12197)	Int'l Orange (12197)
LARC	Black (17038)	White (17925)	White (17925)
LCM	Black (17038)	Black (17038)	Black (17038)
LCVP	Red (11105)	Black (17038)	Black (17038)
Motor Cargo Boats	White (17925)	White (17925)	White (17925)
Motor Lifeboats (44')	Red (11105)	Black (17038)	White (17925)
Motor Lifeboats (47')	Black (17038)	Black (17038)	No Coating
Motor Surf Boats	White (17925)	White (17925)	White (17925)
TANB	Hull and freeboard no longer painted. Remove coatings in lieu of repainting.		
USCGC MACKINAW	Red (11105)	Black (17038)	Red (11105)
Utility Boat (41')	Black (17038)	Black (17038)	White (17925) **
WAGB	Black (17038)	Black (17038)	Red (11105)
WHEC	Red (11105)	Black (17038)	White (17925)
WIX	Red (11105)	Black (17038)	White (17925)
WLB	Red (11105)	Red (11105)	Black (17038)
WLI	Red (11105)	Red (11105)	Black (17038)
WLIC	Red (11105)	Red (11105)	Black (17038)
WLM	Red (11105)	Red (11105)	Black (17038)
WLR	Red (11105)	Red (11105)	Black (17038)
WMEC	Red (11105)	Black (17038)	White (17925)
WPB	Red (11105)	Black (17038)	White (17925)
WTGB	Red (11105)	Red (11105)	Black (17038)
WYTL	Red (11105)	Red (11105)	Black (17038)
WYTM	Red (11105)	Red (11105)	Black (17038)

*Note: Many of the coatings specified for the boot-top/underwater body are not available in the FED-STD-595 color numbers listed. Use the color which best approximates the FED-STD-595 color number. For example, cuprous oxide-based antifouling coatings are not available in red. A red oxide (brownish red) would be used instead.

****Note: 41 UTBs that have had the paint removed from the freeboard are not required to repaint**

7. Machinery, Deck. Winches, capstans, winch and capstan controllers, sounding machines and other deck machinery shall be painted as specified in Table 11-3: Miscellaneous Details and Fittings.
8. Masts.
 - a. Masts, including ladders, crow's nests, platforms and their supports and foundations, shall be spar (10371). Equipment secured to the masts, such as pedestals, searchlights or bullhorns shall also be spar.
 - b. Mast areas which are directly in the way of stack gases may be black (17038 or 37038). Areas on masts painted black when the vessel is commissioned will continue to be painted black in service. WAGB (399 ft), WHECs (378 ft.), WMECs (270 ft.) and WMECs (210 ft.) have black

masts. Any extension of these areas beyond that originally authorized or the painting of additional areas black without authorization from Commandant (G-SEN) is prohibited.

9. Miscellaneous Details and Fittings.

TABLE 11-3: Miscellaneous Details and Fittings

Item	Color
Aerial - Drop Pump Canisters	International Orange (12197)
Alarms, Chemical	Green (14260)
Alarms, Collision	Yellow (13538)
Alarms, Emergency, Fire and General	Red (11105)
Applicators	Red (11105)
Applicator nozzles	Polish
Awning Ridgepoles and Stanchions	White (17925)
Battle Lanterns	As manufactured or Yellow (13538)
Bits, side, mounted on gunwales on harbor tugs	Black (17038)
Bits, side, mounted on gunwales on seagoing tugs	Spar (10371)
Bits, mooring and towing	Spar (10371) ³
Blocks (except those in black areas on mast or stack)	Spar (10371) ¹
Blocks, in black area on mast or stack	Black (17038) ¹
Blocks, traveling or fall type, and related swivels and headache balls made of corrosion resistant material.	Painting not required; outline major component with Yellow, or Yellow/Black stripe safety tape/edging. Yellow (13538) if painted
Blocks, traveling or fall type, and related swivels and headache balls made of non-corrosion resistant material.	Yellow (13538); or Yellow (13538)/Black (17038) stripe; or Spar (10371) with Yellow/Black stripe safety tape/edging for large blocks.
Boom Cradle	Spar (10371) ¹
Booms, boat	Spar (10371)
Boarding Ladders	Spar (10371)
Boarding Ladders, Wood	Do not paint. Coat with linseed oil.
Brightwork	Polish and coat with clear plastic or lacquer
Canvas or fabric covers, removable	No coating. Color of fabric to match color of item covered
Capstans ¹	Spar (10371)
Chocks, brass/bronze	Uncoated ³
Chocks, bulwark	Bulwark color ¹
Chocks, except bulwark and roller type	Spar (10371) ¹
Chocks, Roller	Black (17038) ¹
Compass Stands, except binnacle and bright work	White (17925), Optional Blue Grey (16099); Commanding Officer's Discretion
Cranes, Booms, and Frames	Spar (10371)
Davits, all type	Spar (10371)
Deck chests	White (17925)
Deck treads, Non Skid	No coating
Deck Machinery, controls and control stand, and equipment safety bumpers	Spar (10371) ^{1,2}
Diaphones	Spar (10371)

TABLE 11-3 (Cont'd)

Dodgers, Canvas	Fabric color to be blue or white; Commanding Officer's Discretion
Dogs	Grease moving parts, do not Paint. Do not grease oil tight bearings, add oil if required.
Flag Staffs (on white hulls)	Spar (10371)
Flag Staffs (on black & red hulls)	Spar (10371)
Fire Pumps	Red (11105)
Firemain valves, (except threaded and machined parts)	Red (11105)
Flag lockers	White (17925)
Foam valves and outlets (AFFF)	1" wide diagonal stripes, approximately 45° alternating Red (11105) and Green (14062)
Fuel Can, P-100 pump	IAW NSTM 555-4.11.2.9.5.1. Units may deviate from NSTM by replacing Purple stripe with Yellow (13538) and replacing the word "JP-5" with "DIESEL" in Black (17038) letters. ⁴
Fumetight Cover, P-100 pump	IAW NSTM 555-4.11.2.9.4. Units may deviate from NSTM by replacing Purple stripe with Yellow (13538) and replacing the text "WARNING JP-5/F-76 NO SMOKING" with "WARNING DIESEL FUEL NO SMOKING" in Black (17038) letters. ⁴
Gangplanks, metal, except aluminum	White (17925)
Gangplanks, aluminum	No coating
Gasoline cans, portable	Red (11105)
Gasoline drums	Yellow (13538) with "GASOLINE" in Black (17038) letters
Gasoline storage racks	Color of bulkhead
Handrails and lifeline stanchions	White (17925)
Hatch coamings	Spar (10371)
Hatch covers	White (17925)
Hooks, boat davit, crane or cargo boom, and related swivels and headache balls; corrosion resistant material	Painting not required; outline major component with Yellow, or Yellow/Black stripe safety tape/edging. Yellow (13538) if painted.
Hooks, boat davit, crane or cargo boom, and related swivels and headache balls; other than corrosion resistant material	Yellow (13538); or Yellow (13538)/Black (17038) stripe
Hose racks, saddles and reels for fire hose	Red (11105)
Hull numbers and markings	See Chapter 12
Insulators, Electrical	No coating
Jack staffs (on white hulls)	Spar (10371)
Jack staffs (on black and red hulls)	Spar (10371)
Knife edges on watertight doors and hatches	Do not paint. Clean with aluminum oxide abrasive cloth, grit #320
Ladders, except those on masts	White (17925)
Ladders, leading from Buoy Deck	Black (17038)
Ladders, on masts	Spar (10371)
Leather coverings	Oil with preservative, neat's-foot 0-L-165
Name plates	No coating

TABLE 11-3 (Cont'd)

Pelorus pedestals	White (17925)
Pilot House Visor, underside	White (17925) or Blue Grey (16099); Commanding Officer's Discretion
Probe, refueling	Black (17038)
Pump, gasoline powered	Yellow (13538)
Ready service lockers	White (17925)
Release mechanisms	Grease
Rigging, running	Lubricate per COMDTINST M9000.6 Chapter 613.
Rigging, standing	Lubricate per COMDTINST M9000.6 Chapter 613.
Searchlights, except on masts	White (17925)
Searchlights, on masts	Spar (10371)
Searchlight shutters	No coating
Sheaves	Block color or Spar (10371) ¹
Spray shield on bridge, inboard	White (17925) or Blue Grey (16099); Commanding Officer prerogative
Towing bitts See: Bitts, towing	
Towing rail (corrosion resistant material)	No coating
Turtle Back (distinct area adjacent to superstructure where cargo handling gear is attached to deck)	Black (17038)
Ventilators, all types, including gooseneck pipe vents, not attached or immediately adjacent to the superstructure	Spar (10371)
Ventilators/ducts for engine room, not attached to superstructure on 82 WPB.	White (17925)
Notes: ¹ Working surfaces in contact with wire rope or synthetic lines may be coated with gray or green-gray Inorganic Zinc. ² Except that Ingersoll Rand TM standard air winches in use on WLIC/WLR platforms for spud or crossdeck winch service may be OEM factory applied black plasticized marine coating. ³ 47' MLB and 41' UTB shall be bare aluminum ⁴ With regard to P-100 pump markings, the CG allows deviation from NSTM because cutters do not always carry JP-5/F-76. The choice between following the NSTM or following the modified version provided in this Manual is at the discretion of the individual unit.	

9. Miscellaneous Details and Fittings (Cont'd). In general, miscellaneous objects whose color is not specifically prescribed elsewhere in these instructions shall be painted white (17925) if attached or immediately adjacent to some part of the superstructure that is also painted white. They shall be painted spar (10371) if attached or immediately adjacent to masts, spars, or other objects whose prescribed color is spar. Objects standing alone on the deck shall be spar. Stumbling hazards, such as deck padeyes, deck clips, and other projections, shall be painted white for better night visibility.

- a. UTBs shall have bare aluminum with slip resistant sheets.
 - b. LCMs and barges are exceptions and will have all miscellaneous objects painted black (17038).
 - c. Refer to Table 3 for a list of miscellaneous objects most frequently encountered. The general rules shall be applied to objects not listed.
 - d. On newer vessels, first refer to the Vessel Painting Schedule. If not listed there, follow the miscellaneous painting instructions listed in this Section.
10. Open Hulls, Cockpits and Cargo Spaces. The exterior freeboard and boot top of open hulls are painted according to Table 2. The interiors of shipboard open hulls are painted spar (10371) and the interiors of all others are painted as follows: The inside of open hulls and the cockpits and cargo spaces of decked hulls shall be white (17925) down to the side seats or risers, or down to the cockpit deck, grating, or floorboards if there are no side seats or risers. UTLs will have blue gray (16099) decks unless these decks are of color-impregnated material. Blue-gray (16099) will be applied below the white including seats, thwarts, inside of hull, cockpit decks, gratings, floorboards or open bilges. Engine trunks not extending appreciably above the sheer line will be blue gray (16099) overall. This color scheme will apply to all boats except as noted below.
- a. LARCs and Motor Cargo Boats will have the entire interior of their cockpit and cargo space painted blue gray (16099).
 - b. LCMs, Barges, and Buoy Boats will have the interior of their cargo spaces black (17038). Bulk barge storerooms will have a white (17925) overhead and bulkheads.
 - c. Flood Relief Punts and Ice Skiffs will have the entire interior, including hull, thwarts, floor boards, and bilges painted international orange (12197).
11. Ordnance Equipment. Interior and exterior surfaces of enclosed gun mount shields are to be painted white (17925). The interior gun mechanism and equipment shall be painted gray (16376). Gun barrels shall be painted black (27038). The foundations of all gun mounts, mortars, launchers, and gun directors shall be painted the same color as the deck on which they are mounted. All open gun mounts and mortars shall be painted black (27038). Close-in-Weapons System (CIWS) shall be maintained in the delivered preservation color. Super Rapid Blooming Outboard Chaff (SRBOC) launching systems shall be maintained in the delivered preservation color in accordance with NAVSEA Technical Manual SW393-AI-MMM-010/MK36/1-2. MK92 FCS CAS RADOMES shall be spray painted white (17925) with Silicone Alkyd Paint MIL-PRF-24635, Type II. Dry film thickness shall not exceed 6 mils total. Film thickness tolerance must be maintained to avoid interference with radar transmission.
- a. Ready service lockers, pyrotechnic lockers, explosive lockers, and detonator lockers shall be painted white (17925) and conspicuously labeled with the content of each locker. The label shall be stenciled in red (11105) letters of the largest practical size.
 - b. Bulkheads and magazine overheads shall be painted white (27886). Magazine decks shall be painted blue gray (16099). Ammunition dredger hoists and their controllers shall be painted equipment gray (16376). Gun directors and all fire control equipment shall also be painted equipment gray.
12. Piping Systems. See interior piping systems, section 11.C.4. Running Light Screens.
13. Running Light Screens. Shall be painted black (37038).

14. Smoke Stack. Stack exteriors shall be painted spar (10371) with a black (17038) band around the top of the stack, unless otherwise authorized by the Commandant (G-SEN). The width of the band shall equal 1/2 the fore-and-aft diameter of the stack or 1/5 the height of the stack, whichever is smaller. If the stack has a hood, the hood shall also be painted black and will form an extension of the band. WHEC's (378 ft.) and WMEC's (270 ft. and 210 ft.) shall follow the Vessel Painting Schedule of a white (17925) stack with a black band.
15. Spuds. Shall be flat black (37038). A red (11105) 6 inch wide band shall be painted completely around the spud 6 feet from the top. This is to prevent personnel from lowering the spud too far. Further down the spud where the pin inserts, paint a red (11105) 6 inch wide band and above the red band paint a yellow (13538) 6 inch wide band. The yellow band will act as a warning and the red band will locate the pin hole so that the spud is not raised any higher.
16. Superstructure. The superstructure and all attachments secured, bracketed or adjacent to the superstructure shall be white (17925). This includes:
 - a. Aircastles, in board and outboard
 - b. Breakwaters
 - c. Bridgewings
 - d. Bulwarks, bulwark supports and brackets (bulwarks forming an extension of the hull shall be painted the hull color outboard. The inboard bow bulwark on icebreakers may be painted with dull black to cut glare).
 - e. Cabins (where there is no distinct demarcation between vertical and horizontal surfaces, such as on the cabins of 44-ft motor lifeboats, white shall be used over the entire cabin).
 - f. Canvas dodgers attached to superstructure, bulwarks or bridge wings (optional blue - CO prerogative; inboard side on the bridge may be painted blue gray (16099) to reduce glare).
 - g. Deck houses
 - h. Electrical conduits
 - i. Engine trunks
 - j. Gun shields
 - k. Gun tubs
 - l. Ladders
 - m. Passageways, including overheads
 - n. Pilothouses (underside of visor over pilothouse windows may be painted blue gray (16099) to reduce glare).
 - o. Shelters, including overheads
 - p. Spray shields (inboard side on the bridge may be painted blue gray (16099) to reduce glare).
 - q. Stanchions
 - r. Switch boxes
 - s. Ventilation ducts
17. Underwater Body/Boot-Top. (See Table 11-2: Underwater Body, Boot-top, and Freeboard Colors).
 - a. Underwater Body. The underwater body coating systems include the area from the bottom of the keel to the upper edge of the boot-topping. It also includes rudders, bilge keels, skegs, seachests and gratings. Use alternating colors for the different coats of anticorrosive (AC) epoxy paint and antifouling (AF) paint. Table 11-4 contains two recommended schemes.

TABLE 11-4: Antifouling Paint Scheme

Freeboard	Underwater Body (including Boot-Top)				Boot-Top Only
	AC 1 st Coat	AC 2 nd Coat	AF 3 rd Coat	AF 4 th Coat	AF 5 th Coat
Black Hull	Red	Gray	Black	Red	Red
White Hull	Red	Gray	Black	Red	Black
Red Hull: Single Coat System	Black	-	-	-	-
Multi-Coat System	Gray	Red	-	-	Black

b. Boot-Top.

- (1) Location of Lower Edge. The lower edge of the boot-topping shall be the light load waterline on all steel, aluminum and plastic vessels, and on wooden vessels where metal sheathing is installed in the boot-topping area. On all other wooden vessels, the lower edge of the boot-topping shall be the full-load waterline.
- (2) Location of Upper Edge.
 - (a) For all vessels with a length of 150 feet or more, the upper edge of the boot-topping at amidships will be above the full-load waterline, a distance equal to one-eighth of the freeboard measured from the full-load waterline. The upper edge of the boot-topping at the bow will be above the full-load waterline, a distance 1.33 times the distance that the upper edge of the boot-top is above the full-load waterline at amidships. The upper edge of the boot-topping at the stern will be above the full-load waterline, a distance 0.66 times the distance that the upper edge of the boot-top is above the full-load waterline at amidships.
 - (b) For all vessels with a length of 65 feet or more but less than 150 feet, the upper edge of the boot-topping at amidships will be above the full-load waterline, a distance equal to one-sixth of the freeboard measured from the full-load waterline. The upper edge of the boot-topping at the bow will be above the full-load waterline, a distance 1.33 times the distance that the upper edge of the boot-top is above the full-load waterline at amidships. The upper edge of the boot-topping at the stern will be above the full-load waterline, a distance 0.66 times the distance that the upper edge of the boot-top is above the full-load waterline at amidships.
 - (c) For all vessels with a length less than 65 feet, the upper edge of the boot-topping at amidships will be above the full-load waterline, a distance equal to one-fourth of the freeboard measured from the full-load waterline. The upper edge of the boot-topping at the bow will be above the full-load waterline, a distance 2 times the distance that the upper edge of the boot-topping is above the full-load waterline at amidships. The upper edge of the boot-topping at the stern will be above the full-load waterline, a distance equal to the distance that the upper edge of the boot-top is above the full-load waterline at amidships.
 - (d) When the chines, rubbing rails or spray rails interfere with or lie close to the upper edge of the boot-topping, the upper edge of the boot-topping shall be adjusted the minimum amount to be parallel to and either completely above or completely below the chine, rubbing rails or spray rails.
 - (e) Contracting Officers may authorize some variation to the above criteria for newly

constructed vessels. In general, they shall not be changed and the upper edge of the boot-topping shall be retained as originally applied. In all cases, the upper edge of the boot-topping shall be a fair and visually pleasing line from stem to stern.

18. Weather Decks. Weather decks may be painted with CG gloss dark gray (16099) or Navy flat dark gray (36076) with the exception of UTBs **and** MLBs which shall be bare aluminum with slip resistant sheets. Where there is a coaming at the deck edge, the deck paint will be extended up the inboard surface of the coaming. Deck paint shall also be applied to bounding angles between decks and superstructure or hatch coaming where superstructure and hatch coamings are welded to the deck. A dado of dark gray shall be applied to the vertical surfaces and shall not to exceed 12 inches in height. Waterways shall also be painted dark gray. Water tight door jams in the dado may be painted black to mask scuff marks. Buoy tender working decks should be gray (36231). Proprietary coatings authorized for use on buoy tender working decks may be green-gray in color. Red-gray colors are not authorized.

C. Interior Spaces.

1. Interior Colors - Epoxy (See Table 11-5). In all spaces requiring an epoxy as the topcoat, use a high build epoxy which approximates the following colors:

TABLE 11-5: Interior Colors - Epoxy

<u>COLOR</u>	<u>FED STD 595</u>
Black	27038
Dark Gray	26099
Gray	26270
Light Gray	26373
Green	24272
Red	20152
White	27886
Yellow	23594

2. Interior Colors - Fire Retardant Paint (See Table 11-6). All specifications shall include the requirements of this manual. All vessels shall use the coating systems in this manual for painting the vessel interior. In all spaces requiring fire retardant paint, colors are limited to those found in the Chlorinated Alkyd Fire Retardant Paint (DOD-E-24607) and Water Based Fire Retardant Paint (MIL-PRF-24596) specifications. This currently includes:

TABLE 11-6: Interior Colors - Fire Retardant Paint

<u>COLOR</u>	<u>FED STD 595</u>
Soft White	27880
Pastel Green	24585
Bulkhead Gray	26307
Beach Sand	22563
Rose Wood	22519
Clipper Blue	24516
Sun Glow	23697
Green Gray	26496
Yellow Gray	26400
Pearl Gray	26493
Pastel Blue	25526

Color Selection. The CO's and OIC's are authorized to select any color combination from the above list if it is not in conflict with the safety color code requirements found elsewhere in this manual.

3. Miscellaneous Interior Spaces (See Table 11-7).

TABLE 11-7: Miscellaneous Interior Spaces

Interior Space	1st Coat ^{1,2}	2nd Coat	3rd Coat	Topcoat ³
Bilges and Cofferdams	Light Gray (26373)	-	-	Red (20152)
Bulkheads, Firezone	Green (24272)	-	-	White (27875)
Bulkheads and Overheads, Uninsulated Aluminum	Green (24272)	-	-	Soft White (27880) or Pastel Green (24585)
Bulkheads and Overheads, Uninsulated Steel	Green (24272)	Light Gray (26373)	-	Soft White (27880) or Pastel Green (24585)
Bulkheads and Overheads, Uninsulated Metal-wet areas	Green (24272)	-	-	As required
Bulkheads and Overheads, Uninsulated Steel/Aluminum-appearance not a factor	Green (24272)	-	-	Gray (26270)
Chain Lockers	-	-	-	Gray (26270)
Condensation, Space Subjected to	Light Gray (26373)	Green (24272)	Light Gray (26373)	Soft White (27880) or Pastel Green (24585)
Deckplates, Steel/Aluminum (Bottom and edges)	-	-	-	Gray (26270)
Decks, Steel/Aluminum-wet areas	Green (24272)	-	-	Color as required
Decks, Steel/Aluminum-dry areas and non-skid	Green (24272)			Deck Red (10076) or Light Gray (16251)
Doors, Joiner	Green (24272)	-	-	Soft White (27880) or Pastel Green (24585)
Electric Cable, Armored	Green (24272)	-	-	Match adjacent bulkhead
Furniture and Galley Equip.	Green (24272)	-	-	Soft White (27880) or Pastel Green (24585)
Inaccessible Areas, Steel/Aluminum	Green (24272)	-	-	Gray (26270)
Insulation Surfaces, Fiberglass Sheet	-	-	-	Soft White (27880) or Pastel Green (24585)
Insulation Surfaces, Closed Cell PVC	White	-	-	White (Can be tinted to match adjacent bulkhead)
Machinery, Operating Temp. < 200°F	Green (24272)	-	-	Gray (26307) or match OEM color
Machinery, Operating Temp. > 200°F	-	-	-	Aluminum
Piping, Insulated/Uninsulated < 200°F	-	-	-	See Next Section.
Piping, Uninsulated > 200°F	-	-	-	Aluminum
Tanks and Voids, General	Use appropriate system from MIL-P-23236. Choose white as topcoat unless it is not manufactured in that color. Undercoats should be contrasting colors.			
Wood, Painted Interior	Green (24272)	-	-	Soft White (27880) or Pastel Green (24585)
Wood, Stained and Varnished Interior	Choose appropriate stain from list for TT-S-711			

Notes: ¹ Mist coats are not included.

² Color of underlying primer coat(s) is not critical, however, each coat should provide color contrast to ensure complete coverage during application.

³ Applies to final two coats of coatings such as DOD-E-24607 Chlorinated Alkyd and MIL-PRF-24596 Fire Retardant.

4. Piping Systems. All piping and valve bodies with the exception of that for oxygen and for firemain shall be painted to match adjacent bulkheads or overheads. Packing glands, valve stems, threads and similar working surfaces shall not be painted.
- Where feasible, all piping shall be marked to show the name of the service, destination and the direction of flow where practical.
 - The name of the service and destination shall be painted on by stencil or hand lettering or by applying adhesive-backed tape, previously printed, stenciled or lettered. Lettering shall be one inch high for two inch or larger outside diameter bare pipe or insulation. For smaller sizes, lettering size may be reduced or label plates attached by wire or other suitable means.
 - Direction of flow shall be indicated by an arrow three inches long pointing away from the lettering. For reversible flow, arrows are to be shown on each end of the lettering.
 - Lettering and arrows shall be black except for dark colored pipe, including oxygen piping, for which they shall be white.
 - Markings shall be applied to piping in conspicuous locations, preferably near control valves and at suitable intervals so that every line shall have at least one identification marking in each compartment through which it passes. Piping marking in cabins, officers' wardroom and messrooms, and warrant officers' messrooms is optional.
 - Valves are marked by inscribing the rims of handwheels, by a circular label plate secured by the handwheel nut, or by label plates attached to the ship's structure or to the adjacent piping.
 - Piping system valve handwheels and operating levers shall be provided with a standardized color code identification for training and casualty control purposes.

TABLE 11-8: Piping System Identification Color Code

Piping Contents	Valve Handwheel/ Operating Lever	Fed Std 595 Color Number
Steam	White	(17925)
Potable Water	Dark Blue	(15044)
Nitrogen	Light Gray	(16376)
H.P. Air	Dark Gray	(16081)
L.P. Air	Tan	(10324)
Oxygen	Light Green	(14449)
Salt Water	Dark Green	(14062)
JP-5	Purple	(17142)
Fuel Oil/Gasoline	Yellow	(13538)
Lube Oil	Striped Yellow/Black	(13538)(17038)
Firemain & Plugs	Red	(11105)
AFFF (Foam)	Striped Red/Green	(11105)(14062)
Feedwater	Light Blue	(15200)

TABLE 11-8 (Cont'd)

Hydraulic Fluid	Orange	(12246)
Refrigerants	Dark Purple	(17100)
Hydrogen	Chartreuse	(23814)
Cleaning Fluid	Brown	(10080)
Helium	Buff	(10371)
Helium/Oxygen	Striped Buff/Green	(10371)(14449)
Sewage	Gold	(17043)
Halon	Striped Gray/White	(16187)(17925)

- h. Valve handwheels and operating levers may be painted with brush or spray. Paint these items with the same coatings used on the machinery which they are fastened to.
- i. Oxygen pipes, including valve bodies, shall be light green (14449).
- j. Firemain valves, magazine sprinkler valves and fire hose connections, except threaded parts, valve stems and other working parts, shall be painted red (11105). The remainder of firemain and sprinkler main piping system shall be painted to match the surrounding areas. Aluminum sprinkler piping in magazines area shall not be painted.

APPENDIX A. CUTTERS AND BOATS EXTERIOR PAINTING SYSTEM

A. Vessel Coating Systems - Exterior. This appendix presents the required coatings for various exterior areas and components of Coast Guard cutters and boats. The coating systems for each area are presented in tabular form. The tables include the surface preparation, primer, intermediate coats if any, and topcoat. The various coatings used for a particular application should be regarded as a system. The coating system shall be obtained from a single manufacturer to ensure that the individual components are compatible and to maximize performance. Thickness references apply to the dried film and is abbreviated as DFT (dry film thickness). Subject matter in this chapter is listed alphabetically. References are by paragraph heading and include:

1. Accommodation Ladders, Wood. (See Wood, Exterior)
2. Anchors/Anchor Chains.
3. Antenna Hardware, Radio and Radar, DF Loops.
4. Bilge Keel. (See Underwater Body/Boot-Top)
5. Boat Hooks. (See Wood, Exterior)
6. Boatswain's Chairs. (See Wood, Exterior)
7. Boot-Top. (See Underwater Body/Boot-Top)
8. Electric Cables, Armored, Exterior.
9. Fittings.
10. Flight Deck.
11. Freeboard/Superstructure/Mast.
 - a. Freeboard/Superstructure/Mast, Steel
 - b. Freeboard/Superstructure/Mast, Aluminum
 - c. Freeboard/Superstructure/Mast, Aluminum, Unpainted
 - d. Freeboard/Superstructure, Fiber Glass
12. Gangplanks, Wood. (See Wood, Exterior)
13. Gratings, Wood. (See Wood, Exterior)
14. Inaccessible Areas.
 - a. Inaccessible Areas, Steel
 - b. Inaccessible Areas, Galvanized Steel or Aluminum
15. Ladders, Wooden. (See Wood, Exterior)
16. Machinery, Deck.
17. Masts. (See Freeboard/Superstructure/Mast)
18. Metal Repair and Hull Smoothing
19. Piping, Exterior.
20. Propellers. (See Underwater Body/Boot-Top)
21. Propeller Shafts. (See Underwater Body/Boot-Top)
22. Railing, Wood. (See Wood, Exterior)
23. Rudders. (See Underwater Body/Boot-Top)
24. Sea Chests and Gratings. (See Underwater Body/Boot-Top)\
25. Skegs. (See Underwater Body/Boot-Top)Smoke Stacks.
26. Spuds.
27. Strongbacks, Wood. (See Wood, Exterior)
28. Superstructure. (See Freeboard/Superstructure/Mast)
29. Transducer Hull Rings.
30. Underwater Body/Boot-top.
 - a. U/W Body and Boot-Top, Steel Hulls (5-10 Years), in Salt Water
 - b. U/W Body and Boot-Top, Steel Hulls, in Fresh Water
 - c. U/W Body and Boot-Top, Icebreaker >350', in Salt Water
 - d. U/W Body and Boot-Top, Icebreaker <350', in Salt Water
 - e. U/W Body and Boot-Top, Icebreaker in Fresh Water
 - f. U/W Body and Boot-Top, Aluminum Hulls

- g. U/W Body and Boot-Top, Aluminum Hulls (in waters with limited fouling)
 - h. U/W Body and Boot-Top, Fiber Glass Hulls in Salt Water
 - i. U/W Body Appendages: High Turbulent Areas
 - j. U/W Body Propellers
 - k. 11. U/W Body Shafts
 - l. 12. U/W Body Seachest, Icebreaker in Fresh Water
 - m. 13. U/W Body Zincs
31. Weather Decks.
- a. Weather Deck Non-Skid, Steel
 - b. Weather Deck Non-Skid, Aluminum
 - c. Weather Deck Slip Resistant Sheets
 - d. Weather Deck, Buoy Tender Working Deck
32. Wood, Exterior.
33. Zinc (or other Sacrificial) Anodes. (See Underwater Body/Boot-Top)

Warning

PERSONNEL INVOLVED IN THE APPLICATION OF PAINTS, PRIMERS, VARNISHES, OR SIMILAR TREATMENTS, OR THE PREPARATION OF SURFACES FOR THE APPLICATION OF PAINT OR PAINT PRODUCTS, SHALL BE FAMILIAR WITH THE CONTENTS OF CHAPTER 2 OF THIS MANUAL, THE INFORMATION CONTAINED ON ALL APPLICABLE MATERIAL SAFETY DATA SHEETS, AND TECHNICAL GUIDE: PRACTICES FOR RESPIRATORY PROTECTION, COMDTINST M6260.2 (series). PERSONNEL SHALL ALSO BE FAMILIAR WITH THE ENVIRONMENTAL ISSUES ADDRESSED IN CHAPTER 3 OF THIS MANUAL.

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
ANCHOR/ANCHOR CHAIN					
		SSPC-SP 6/NACE NO. 3 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) Polysiloxane 2) Polysiloxane 3) Polysiloxane	Mist Coat 5.0-6.0 5.0-6.0	1
ANTENNA HARDWARE, RADIO AND RADAR, DF LOOPS					
		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) [metal hardware only]	1) High Build Epoxy 2) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 2.0-3.0	2
ELECTRIC CABLES, ARMORED, EXTERIOR					
	I	Clean with Adhesion Promoter/Cleaner. Break gloss with sandpaper as required.	1) Polysiloxane 2) Polysiloxane	5.0-6.0 2.0-3.0	2, 3, 39
	II	Same as Option I	1) High Build Epoxy (dip the cable) 2) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 2.0-3.0	
FITTINGS					
Bulkhead and deck fittings, including pad eyes, links, chain stoppers. . .		Use the same surface preparation as used for surfaces on which fittings are attached.	Use the same coating system as for surfaces on which fittings are attached (for deck fittings: omit non-skid aggregate and select top color coat as per Chapter 11.)		
FLIGHT DECK					
	I	SSPC-SP 10/NACE NO. 2 using AA-1043 Steel Shot or grit conforming to MIL-A-22262 / (3.0-4.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) MIL-PRF-24667 Type I, Comp. G Primer 2) MIL-PRF-24667 Type I, Comp. G Non-skid	Follow Manuf. Instructions	4, 5
	II	Same as Option I	1) MIL-PRF-24667 Type II, Comp. G Primer 2) MIL-PRF-24667 Type II, Comp. G UV Resistant Epoxy/Low Solar Absorbing Non-skid	Follow Manuf. Instructions	
FREEBOARD/SUPERSTRUCTURE/MAST					
Freeboard/ Superstructure, Steel	I	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")	1) Zinc Rich Primer-Polysiloxane System 2) Polysiloxane 3) Polysiloxane	3.0-4.0 1.0-2.0 5.0-6.0	2, 6, 7, 8, 9, 10, 39

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
	II	Same as Option I	1) Zinc Rich Primer-Polysiloxane System 2) Epoxy Primer/Mid - Coat - Polysiloxane Sys 3) Polysiloxane	3.0-4.0 5.0-6.0 5.0-6.0	
	III	Same as Option I	1) Epoxy Primer/Mid - Coat - Polysiloxane Sys 2) Epoxy Primer/Mid - Coat - Polysiloxane Sys 3) Polysiloxane	5.0-6.0 5.0-6.0 5.0-6.0	
	IV	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc 2) High Build Epoxy 3) High Build Epoxy 4) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	3.0-4.0 Mist Coat 5.0-6.0 2.0-3.0	
	V	Same as Option I	1) High Build Epoxy 2) High Build Epoxy 3) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 5.0-6.0 2.0-3.0	
Freeboard/ Superstructure, Aluminum	I	Brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.5-2.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")	1) Polysiloxane 2) Polysiloxane	1.0-2.0 5.0-6.0	39
	II	Same as Option I	1) Epoxy Primer/Mid - Coat - Polysiloxane Sys 2) Polysiloxane	5.0-6.0 5.0-6.0	
	III	Same as Option I	1) High Build Epoxy 2) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 2.0-3.0	
Freeboard/ Superstructure, Aluminum, Unpainted		Blast with glass bead: 1) #8 conforming to MIL-G-9954A, 2) No. AGB-18 (U.S. sieve size 70-100) as designated by AMS 2431A, or 3) commercial equivalent	-	-	36, 37, 39
Freeboard/ Superstructure, Fiber Glass Fiber Reinforced Plastic [FRP]/Fiber Reinforced Epoxy/	I	Sand lightly with 120 grit paper to break the glaze and roughen the surface then wash with Adhesion Promoter/Cleaner . On new material, remove mold release by washing with cleaner before sanding and clean again.	1) Polysiloxane 2) Polysiloxane	Mist Coat 3.0-4.0	2, 8, 39

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
Fiber Reinforced Polyester)	II	Same as Option I	1) High Build Epoxy 2) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	Mist Coat 2.0-3.0	
INACCESSIBLE AREAS					
Inaccessible Areas, Steel	I	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc	3.0-4.0	6, 9
	II	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	
	III	Brush blast with grit conforming to MIL-A-22262 or mechanical tools	1) MIL-C-16173 Solvent Cutback Corrosion Preventive Compound, Grade 3 (1 coat)	-	
Inaccessible Areas, Galvanized Steel or Aluminum		Roughen by brush blasting with clean fine aluminum oxide, garnet or equivalent inert material, or mechanical tools	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	11
MACHINERY, DECK					
	I	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")	1) Zinc Rich Primer-Polysiloxane System 2) Polysiloxane 3) Polysiloxane	3.0-4.0 1.0-2.0 5.0-6.0	2, 6, 7, 8, 9, 10, 12, 39
	II	Same as Option I	1) Zinc Rich Primer-Polysiloxane System 2) Epoxy Primer/Mid - Coat - Polysiloxane Sys 3) Polysiloxane	3.0-4.0 5.0-6.0 5.0-6.0	
	III	Same as Option I	1) Epoxy Primer/Mid - Coat - Polysiloxane Sys 2) Epoxy Primer/Mid - Coat - Polysiloxane Sys 3) Polysiloxane	5.0-6.0 5.0-6.0 5.0-6.0	
	IV	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc 2) High Build Epoxy 3) High Build Epoxy 4) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	3.0-4.0 Mist Coat 5.0-6.0 2.0-3.0	

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
	V	Same as Option I	1) High Build Epoxy 2) High Build Epoxy 3) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 5.0-6.0 2.0-3.0	
METAL REPAIR AND HULL SMOOTHING					
		<u>Steel</u> : SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5) <u>Aluminum</u> : Brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.5-2.5)	1) DOD-PRF-24176 Cement, Epoxy, Metal Repair and Hull Smoothing	Follow Manuf. Instructions	38
PIPING, EXTERIOR					
	I	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) Polysiloxane 2) Polysiloxane	5.0-6.0 5.0-6.0	2, 39
	II	Same as Option I	1) High Build Epoxy 2) High Build Epoxy 3) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 5.0-6.0 2.0-3.0	
SMOKE STACK					
Smoke Stack Casing, Steel Exterior		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc 2) High Build Epoxy 3) High Build Epoxy 4) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	3.0-4.0 Mist Coat 5.0-6.0 2.0-3.0	2, 6, 8, 9, 10
Smoke Stack Casing, Steel Interior (containing uninsulated exhaust piping)		SSPC-SP 6/NACE NO. 3 using grit conforming to MIL-A-22262 / (1.0-2.0)	1) TT-P-28 Heat Resisting Aluminum Paint 2) TT-P-28 Heat Resisting Aluminum Paint	1.0-2.0 1.0-2.0	
Smoke Stack Casing, Steel Interior (containing insulated exhaust piping)		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) High Build Epoxy 2) High Build Epoxy 3) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 5.0-6.0 2.0-3.0	2
Smoke Stack Exterior Within Casing		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
SPUDS					
	I	SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) Polysiloxane 2) Polysiloxane	5.0-6.0 5.0-6.0	2, 13, 39
	II	Same as Option I	1) High Build Epoxy 2) High Build Epoxy 3) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 5.0-6.0 2.0-3.0	
TRANSDUCER HULL RINGS					
Exterior surfaces		Same surface preparation as the rest of the Underwater Body Surfaces	Use the same coating system as the rest of the Underwater Body Surfaces		14
UNDERWATER (U/W) BODY/BOOT-TOP					
U/W Body and Boot-Top, Steel Hulls (5-10 Years), in Salt Water		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) MIL-PRF-24647 Anti-corrosive Epoxy 2) MIL-PRF-24647 Anti-corrosive Epoxy 3) MIL-PRF-24647 Copper Ablative, Type I, Class 1A 4) MIL-PRF-24647 Copper Ablative, Type I, Class 1A 5) MIL-PRF-24647 Copper Ablative, Type I, Class 1A (Boot-Top only)	5.0-6.0 5.0-6.0 5.0-6.0 5.0-6.0 5.0-6.0	15, 16, 17, 18, 19, 40
U/W Body and Boot-Top, Steel Hulls, in Fresh Water		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) MIL-PRF-24647 Anti-corrosive Epoxy 2) MIL-PRF-24647 Anti-corrosive Epoxy	5.0-6.0 5.0-6.0	16, 18, 20
U/W Body and Boot-Top, Icebreaker > 350', in Salt Water		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (3.5-5.5)	1) Anti-Abrasion Coating, Icebreaker, Salt Water >350'	20-30	16, 18, 21
U/W Body and Boot-Top, Icebreaker <350', in Salt Water		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) Anti-Abrasion Coating, Icebreaker, Salt Water <350' And Fresh Water 2) Anti-Abrasion Coating, Icebreaker, Salt Water <350' And Fresh Water 3) MIL-PRF-24647 Copper Ablative, Type I, Class 1A 4) MIL-PRF-24647 Copper Ablative, Type I, Class 1A	Follow Manuf. Instructions 5.0-6.0 5.0-6.0	16, 18, 22

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
U/W Body and Boot-Top, Icebreaker, in Fresh Water (Excluding Sea Chests)		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) Anti-Abrasion Coating, Icebreaker, Salt Water <350' And Fresh Water 2) Anti-Abrasion Coating, Icebreaker, Salt Water <350' And Fresh Water 3) Anti-Abrasion Coating, Icebreaker, Salt Water <350' And Fresh Water (Boot-topping on CGC Mackinaw only)	Follow Manuf. Instructions	16, 18, 22
U/W Body and Boot-Top, Aluminum Hull	I	Brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.5-2.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) MIL-PRF-24647 Anti-corrosive Epoxy 2) MIL-PRF-24647 Anti-corrosive Epoxy 3) Antifoulant, Non-copper 4) Antifoulant, Non-copper 5) Antifoulant, Non-copper 6) Antifoulant, Non-copper (Boot-Top only) 7) Antifoulant, Non-copper (Boot-Top only)	5.0-6.0 5.0-6.0 3.0-4.0 3.0-4.0 3.0-4.0 3.0-4.0 3.0-4.0	16, 18, 22, 23, 24
	II	Same as Option I	1) Fouling Release Coating System	Follow Manuf. Instructions	
U/W Body and Boot-Top, Aluminum Hull (in waters with limited fouling)		Brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.5-2.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) MIL-PRF-24647 Anti-corrosive Epoxy 2) MIL-PRF-24647 Anti-corrosive Epoxy	5.0-6.0 5.0-6.0	16, 18, 22, 41
U/W Body and Boot-Top, Fiber Glass Hulls in Salt Water		Roughen surface with 120 grit paper and wash with Adhesion Promoter/Cleaner. On new surfaces, remove mold release with a cleaner, sand and clean again.	1) MIL-PRF-24647 Anti-corrosive Epoxy 2) MIL-PRF-24647 Copper Ablative, Type I, Class 1A 3) MIL-PRF-24647 Copper Ablative, Type I, Class 1A	Mist Coat 4.0-5.0 4.0-5.0	8, 16, 18, 22, 25, 26
U/W Body Appendages: High Turbulent Areas (i.e., Rudders, Struts, Fins for 110 WPBs)		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-1")	1) High Turbulence Coating 2) High Turbulence Coating 3) Follow with same number coats of antifoulant used for the rest of the underwater body	10.0-11.0 10.0-11.0 -	40
U/W Body Propellers		<u>Cast Steel and Cast Iron:</u>	Treat the same as Underwater Body Appendages		
		<u>All Other Materials:</u>	Clean and polish bright. - Do not paint -		

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
U/W Body Shafts		<u>Corrosion Resistant Materials (such as Monel, Aquamet, and FRP wrap):</u> Clean and polish metallic surfaces bright. <u>All Other Materials:</u> Use same surface preparation method as the rest of the underwater body	- Do not paint - Apply same antifouling coating system as the rest of the underwater body	-	
U/W Body Sea Chest, Icebreaker in Fresh Water		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc	3.0-4.0	9
U/W Body Sea Chest, Sea Chest Strainer Plates, Grid Cooler Hull Recesses in Fresh Water (for WLR River Tenders and Barges)		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) MIL-PRF-24647 Anti-corrosive Epoxy 2) MIL-PRF-24647 Copper Ablative, Type I, Class 1A 3) MIL-PRF-24647 Copper Ablative, Type I, Class 1A	Mist Coat 4.0-5.0 4.0-5.0	8, 16, 18, 25, 26
U/W Body Zincs (or other sacrificial anodes)			- Do not paint -		27
WEATHER DECKS					
Weather Deck Non-Skid, Broadcast Grit for Steel or Aluminum		Perform the same surface preparation used for Freeboard/Superstructure	1) Apply the same coating system used for Freeboard/Superstructure 2) #8-16 Garnet or inert grit conforming to MIL-A-22262 3) Polysiloxane or MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1, as appropriate	2.0-3.0	6, 7, 8, 9, 10, 28, 39
Weather Deck Non-Skid, MIL-SPEC Coating for Steel or Aluminum		<u>Steel:</u> SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")	1) MIL-PRF-24667 Type I, II, III, or IV Comp. G Primer 1a) MIL-PRF-24667 Type III Intermediate Membrane (Only for Type III) 2) MIL-PRF-24667 Type I, II, III, or IV Comp. G Non-skid	Follow Mfr's Instructions	29, 30, 31

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
		<u>Aluminum</u> : Brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.5-2.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")			
Weather Deck Slip Resistant Sheets	I	<u>Steel</u> : SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")	1) Zinc Rich Primer-Polysiloxane System 2) Polysiloxane 3) Polysiloxane 4) Slip Resistant Sheet 5) Edge Sealing Compound	3.0-4.0 Mist Coat 5.0-6.0	6, 7, 8, 32
	II	Same as Option I	1) Zinc Rich Primer-Polysiloxane System 2) Epoxy Primer/Mid - Coat - Polysiloxane Sys 3) Polysiloxane 4) Slip Resistant Sheet 5) Edge Sealing Compound	3.0-4.0 5.0-6.0 5.0-6.0	
	III	Same as Option I	1) Epoxy Primer/Mid - Coat - Polysiloxane Sys 2) Epoxy Primer/Mid - Coat - Polysiloxane Sys 3) Polysiloxane 4) Slip Resistant Sheet 5) Edge Sealing Compound	5.0-6.0 5.0-6.0 5.0-6.0	
Weather Deck, Buoy Tender Working Deck		<u>Aluminum</u> : Abrasive blast with glass bead conforming to SAE AMS 2431/6 #AGB-18	1) Slip Resistant Sheet Primer 2) Slip Resistant Sheet 3) Edge Sealing Compound		7, 8, 33
		SSPC-SP 10/NACE NO. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc <u>Safety Markings on Inorganic Zinc Buoy Deck:</u> 1) Polysiloxane 2) Polysiloxane - or - 1) High Build Epoxy 2) High Build Epoxy 3) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	3.0-4.0 Mist Coat 5.0-6.0 Mist Coat 5.0-6.0 2.0-3.0	

Exterior Surfaces to be Preserved	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	DFT (mils)	Notes
WOOD, EXTERIOR					
Wood, Exterior (i.e., Accommodation Ladder, Boat Hooks, Boatswain's Chairs, Gangplanks and Bows, Gratings, Ladders, Railings, and Strongbacks)		Sand with 80 grit (or coarser) sand paper	1) Synthetic Wood Finish - follow manufacturer's instructions - or - 1) A-A-1800 Spar Varnish 2) A-A-1800 Spar Varnish 3) A-A-1800 Spar Varnish 4) A-A-1800 Spar Varnish 5) A-A-1800 Spar Varnish	- 1.0-2.0 1.0-2.0 1.0-2.0 1.0-2.0 1.0-2.0	34, 35

Notes

1. Do not paint galvanized or stainless steel anchor, chain, or ground tackle.
2. An extra coat of the topcoat may be required, particularly when brushing or rolling, to achieve proper dry film thickness or to get complete color coverage of the primer underneath.
3. Initially dip armored electric cables in the epoxy primer. After pulling the cables, touch up the primer and follow with topcoat. Do not paint identification labels.
4. Apply in accordance with NSTM Ch. 634 for Navy Certification. All flight decks shall be applied and maintained in accordance with NSTM Ch. 634. Color coating flight decks for other than required markings is not authorized. Flight decks shall not be applied by ships work force. However, ships force may make repairs to flight decks and apply flight deck nonskid to any other portion of the weather deck as necessary for personnel safety. Nonskid material is rolled on over primer within 48 hours for best adhesion. On WMEC 210's the flight deck material shall be extended forward to frame 98 for added personnel safety.
5. Power tool cleaning to bare metal (SSPC-SP 11) may be used in areas that cannot be accessed by abrasive blasting or waterjetting.
6. Inorganic zinc paints cause metal fume fever when cut or burned with a torch.
7. With the exception of Ameron Dimetecote 302H, do not use inorganic zinc on water-jetted surfaces.
8. A mist coat is 1.0-2.0 mils (wet film thickness) of paint applied to promote adhesion or compatibility between unlike materials for spray applications only.
9. Water-based inorganic zinc may only be applied when ambient air and substrate temperature are above 50 degrees F, in order for the water to evaporate completely and form a continuous coating. Water based coatings will not dry at relative humidity above 80 percent.

10. An Organic Zinc coating may be used to replace inorganic zinc for repair/maintenance of inorganic zinc systems.
11. All inaccessible voids that bear against the shell shall be welded tight, tested for tightness, and treated by filling and draining with a rust preventive compound conforming to MIL-C-16173, Grade 3. These include rudders, skegs, sealed void spaces at the stem and voids in the bilges or voids constantly exposed to salt water. Inaccessible voids on steel weather decks shall be prime coated wherever possible before welding of the closure plate and shall be tested for tightness. No further treatment is required. Examples are masts, yards, booms, davits, boxed-in foundations, and boxed-in bulwark structures.
12. Coat the working surfaces of machinery or the surfaces of winch and capstan drums that contact line with an Inorganic Zinc (**3.0-4.0** mils), Solvent Cutback Corrosion Preventative Compound, MIL-C-16173 Grade 3, or Thin Film Corrosion Preventative Compound, MIL-C-81309 Type II, Class I.
13. Refer to Chapter 11. Cutters and Boats Colors - Exterior and Interior for painting of safety markings. Apply one coat of MIL-PRF-24635 Silicone Alkyd at 3 mils DFT for color warning bands.
14. Transducer diaphragms are fouling resistant and should only be painted when it is determined, in conjunction with the servicing electronics facility, that the protection of antifouling paint is required.
15. This antifoulant system is a modification of requirements in MIL-PRF-24647 to provide a 10 year system with periodic touch up on a 2-5 year dry-dock cycle. The primer coat and antifoulant is applied over the previous coat of epoxy while still tacky, which is defined as that curing (drying) stage when a fingertip pressed lightly against the film leaves only a slight impression and none of the film sticks to the finger. Cutters and boats painted with ablative paint should be washed with high pressure water (approximately 3000 psi, do not exceed 5000 psi) immediately after being removed from the water to prevent fouling from drying on the paint. When dry-docking for repainting, the defective areas shall be prepared to near white metal and touched up with epoxy. The entire hull should never be abrasive blasted to bare metal unless the entire bottom coat has failed or failure is inevitable in the immediate future.
16. Apply one coat of **polysiloxane** or MIL-PRF-24635 Silicone Alkyd at 3 mils DFT for the draft marks.
17. MIL-P-15931 vinyl antifoulant may be used to maintain/touch-up/repair an existing epoxy/MIL-P-15931 vinyl antifoulant system, but shall not be applied to new construction or an underwater body taken down to bare metal.
18. For coating purposes, the bilge keel, sea chest, gratings, and skegs are treated as part of the underwater body.
19. Ablative Paint is required on all steel cutters and boats which use antifoulant unless specifically excluded by the MLC's. These coatings have a proven record of cost reduction by extending dry-dock intervals, reducing fuel consumption and reducing painting costs. Life span for these coatings is 9-12 years with periodic touch up on a 2-5 year basis. Areas where the primer is worn through on the rudders, stabilizing fins, bow and above the props should be reprimed. When preparing these surfaces, it is a good idea to clean chloride ions out of the corrosion with a high pressure water blast or steam cleaning before grit blasting. Ablative antifoulant paint wears away differentially on the hull and it is color coded to show the high wear areas which will be at the bow, stern, and boot top areas. When repainting, use the original manufacturer's product to make repairs. Ablative paint should be built back up

to the original 10 mil overall thickness below the boot-top and 15 mils on the boot-top. Adding 10 mils of paint over the entire hull at each dry docking will result in excessive film thickness. Ablative paint is applied directly to the epoxy primer while it is still tacky. There is no intermediate coat between the epoxy primer and the ablative paint. Intermediate coats will accomplish nothing and increase the probability that the ablative paint will delaminate.

20. Sea chest, sea chest strainer plates, grid cooler hull recesses for WLR cutters and barges will be coated with a MIL-PRF-24647 Copper Ablative, Type I, Class 1A/Epoxy coating system for zebra mussel control.
21. Fill deep pitting with manufacturers filling compound prior to coating.
22. Total removal of antifouling coatings is not required. Total dry film thickness encountered during removal may exceed specified thicknesses.
23. Contact the manufacturer for application instructions and require the manufacturer's technical representative to be present while the coating is applied. The final coat shall have an almost gloss or wet sheen finish. Areas with a flat finish must be repainted to a wet sheen finish. Fouling release coatings must not be scraped or cleaned with a stiff brush. Once scratched, the topcoat must be reapplied to prevent fouling adhesion.
24. With the Antifoulant, Non-copper option, the underwater body will be white with a black boot-top. In this case, the boot-top is defined as extending six inches below the design water line.
25. Blistered material should be removed, flushed clean with water, thoroughly dried out, and built back up with a 100% solids epoxy chemically resistant filler. Avoid introducing dirt or abrasive blasting grit in to the fiberglass as this may stimulate additional blisters. Structurally damaged areas should be reinforced with a 100% solids chemically resistant epoxy resin. To retard blistering, wash the hull with Adhesion Promoter/Cleaner. Topcoat to 15 mils DFT with 100% solids epoxy tank coating which is chemically resistant. Epoxy resin should contain no water soluble components.
26. Apply the first coat of ablative antifouling paint while the epoxy is still tacky.
27. Do not paint zinc (or other sacrificial anodes). Paint areas beneath all sacrificial anodes the same as the underwater body.
28. For **broadcast grit non-skid** systems, spread #8-16 Garnet or MIL-A-22262 Inert Abrasive Grit over the last **polysiloxane or** epoxy coat when wet. Let it dry for 8 hours and sweep off the excess. Then apply **polysiloxane** or MIL-PRF-24635 Silicone Alkyd Enamel topcoat.
29. Units may opt to apply a coat of inorganic or organic zinc primer **on steel decks (not aluminum)** prior to applying this system. If inorganic zinc is preferred, it must be covered with a mist coat, 1.0-2.0 (wet film thickness) of high build epoxy prior to applying the full high build epoxy primer coat. Do not apply inorganic **or organic** zinc to flight decks.
30. Polyurethane primers, membranes, color toppings, and non-skid are not allowed, even if listed on QPL-24667.
31. Type III non-skid deck coverings with an intermediate underlayment coat should only be used on decks that undergo a great deal of flexing or uneven decks where flatness is required.

32. **Slip resistant sheets have been authorized for all cutters and boats. Installation drawings are available for the 41 UTB, 47 MLB, and 87 WPB (41UT-1901-2, 47B MLB-634-010, and 87-WPB-634-1, respectively). Use the following guidance when installation drawings are not available: 1) Slip resistant sheet material shall be applied to within approximately 2 inches of deck fittings and protrusions and to within approximately 5 inches from coaming and deck edges (Reference - NSTM Ch 634); 2) No more than approximately 3 inches shall separate adjacent pieces on all work and traffic areas (Reference Army Tech Bulletin - Painting of Watercraft TB 43-0144); 3) Avoid applying slip resistant sheet material over raised weld seams.**
33. The safety markings are alternating yellow and black stripes at 45 degrees to the bulwark for a distance of two feet.
34. Do not paint since paint will prevent the detection of cracks and splits.
35. The commercial equivalent to A-A-1800 Spar Varnish may be used.
36. If the surface to be glass bead blasted has been previously painted, the paint may be removed by waterjetting or brushblasting with a very fine aluminum oxide, garnet, or equivalent inert material.
37. The satin aluminum finish shall be defined as having: 1) a surface profile which does not exceed 2.5 mils as measured by TESTEX Press-O-Film Replica Tape (X-Coarse 1.5-4.5 mils) and 2) spherically shaped indentations with a diameter less than or equal to 0.2 mm as measured by an optical comparator such as a Fowler 7X comparator with a #7 reticle.
38. Grit blasting is the best method to prepare the surface, however, it may not be possible to grit blast due to configuration or other restraints. Review manufacturer's instructions to determine other acceptable surface preparation methods.
39. The **polysiloxane** system shall be used for all new construction. The silicone alkyd system should only be selected for maintaining an existing silicone alkyd system or as a lower cost option when superior performance is not a requirement.
40. A High Turbulence Coating that is capable of being applied underwater shall be used for any temporary repairs to the underwater body or appendages where bare metal has been exposed. These coatings are not antifoulants and should be removed and replaced with the standard underwater body coating system at the next drydock.
41. **The underwater body of an aluminum hull boat in fresh water is not required to be painted if fouling has not been an issue in the operating area. In this case, the boot-top of an aluminum hull boat would not require paint if the freeboard is not painted. If the freeboard is painted, then the boot-top above the waterline should be painted with the polysiloxane or silicone alkyd system.**

APPENDIX B. CUTTERS AND BOAT INTERIOR PAINTING SYSTEMS

A. Vessel Coating Systems - Interior. This appendix presents the required coatings for various interior areas and components of Coast Guard cutters and boats. The coating systems for each area are presented in tabular form. The tables include the surface preparation, primer, intermediate coat if any, and topcoat. The various coatings used for a particular application should be regarded as a system. The coating system shall be obtained from a single manufacturer to ensure that the individual components are compatible and maximize performance. Thickness references apply to the dried film and is abbreviated as DFT (dry film thickness). Subject matter in this chapter is listed alphabetically. References are by paragraph heading and include:

1. Bilges, Cofferdams **and Forepeaks**.
2. Bulkheads.
 - a. Bulkheads, Firezone
 - b. Bulkheads and Overheads, Uninsulated Aluminum
 - c. Bulkheads and Overheads, Uninsulated Steel
 - d. Bulkheads and Overheads, Uninsulated Metal (wet areas)
 - e. Bulkheads and Overheads, Uninsulated Steel (appearance not a factor)
 - f. Bulkheads and Overheads, Uninsulated Aluminum (appearance not a factor)
3. Chain Lockers
4. Condensation, Space Subjected to
5. Deckplates
 - a. Deckplates, Steel
 - b. Deckplates, Aluminum
6. Decks, Metal Interior and Non-skid Areas
 - a. Steel and Aluminum Decks (wet areas)
 - b. Steel and Aluminum Decks (dry areas)
 - c. Metal Decks, Non-Skid Tread
7. Door, Joiner
8. Electric Cable, Armored
9. Electronics Equipment
10. Furniture and Galley Equipment
11. Inaccessible Areas
 - a. Inaccessible Areas, Steel
 - b. Inaccessible Areas, Galvanized Steel and Aluminum
12. Insulation Surfaces
13. Ladders, Stainless Steel, Galvanized Steel and Aluminum
14. Machinery, Interior
 - a. Machinery, Operating Temperatures Under 200°F
 - b. Machinery, Operating Temperatures Over 200°F
15. Piping, Interior
 - a. Piping, Insulated and Uninsulated, Under 200°F
 - b. Piping, Uninsulated, Over 200°F
16. Plastic Surfaces
17. Tanks and Voids
 - a. Tanks and Voids, General
 - b. Ballast Tanks
 - c. Fuel/JP-5 Tanks, Service, Storage, Overflow, Drain
 - d. Grey Water, Sewage, and CHT Tanks
 - e. Lube Oil and Fuel Tanks, Unballasted with water extraction systems
 - f. Potable Water Tank
18. Transducer Hull Rings
19. Wood, Interior
 - a. Wood, Painted Interior
 - b. Wood, Stained and Varnished Interior

Warning

PERSONNEL INVOLVED IN THE APPLICATION OF PAINTS, PRIMERS, VARNISHES, OR SIMILAR TREATMENTS, OR THE PREPARATION OF SURFACES FOR THE APPLICATION OF PAINT OR PAINT PRODUCTS, SHALL BE FAMILIAR WITH THE CONTENTS OF CHAPTER 2 OF THIS MANUAL, THE INFORMATION CONTAINED ON ALL APPLICABLE MATERIAL SAFETY DATA SHEETS, AND TECHNICAL GUIDE: PRACTICES FOR RESPIRATORY PROTECTION, COMDTINST M6260.2 (series). PERSONNEL SHALL ALSO BE FAMILIAR WITH THE ENVIRONMENTAL ISSUES ADDRESSED IN CHAPTER 3 OF THIS MANUAL.

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
BILGES, COFFERDAMS, AND FOREPEAKS					
Bilges, Cofferdams, and Forepeaks, Steel	I	SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")	1) Bilge Epoxy Coating System Primer 2) Bilge Epoxy Coating System Topcoat	6.0-7.0 6.0-7.0	1, 14, 15
	II	<u>Non-Machinery Spaces</u> : SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) - or - SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2") - and - <u>Machinery Spaces</u> : SSPC-SP 11 (1.0) or SSPC-SP 12/NACE NO. 5 (To "WJ-2" and "SC-2")	1) Bilge Epoxy Coating System Primer 2) Bilge Epoxy Coating System Primer	6.0-7.0 6.0-7.0	
	III	Same as Option II	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	
Bilges, Aluminum			Do not paint		
BULKHEADS					
Bulkheads, Firezone, Aluminum	I	Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	2, 3, 4
	II	Same as Option I	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant 3) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 1.0-2.0 1.0-2.0	

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
Bulkheads, Firezone, Steel	I	SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	2, 4
Bulkheads and Overheads, Uninsulated Aluminum	I	Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	3, 4
	II	Same as Option I	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant 3) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 1.0-2.0 1.0-2.0	
Bulkheads and Overheads, Uninsulated Steel	I	SSPC-SP 6/NACE No. 3 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	4
	II	Same as Option I	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant 3) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 1.0-2.0 1.0-2.0	
Bulkheads and Overheads, Uninsulated Metal- (Wet areas such as washrooms, water closets, shower space, food prep areas and exits to weather)		<u>Steel</u> SSPC-SP 11 (1.0) - and - <u>Aluminum</u> : Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
Bulkheads and Overheads, Uninsulated Steel- (Appearance not a factor, i.e., voids) and Insulated Steel	I	SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc	3.0-4.0	4
	II	SSPC-SP 6/NACE No. 3 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	
Bulkheads and Overheads, Uninsulated Aluminum- (Appearance not a factor) and Insulated Aluminum		Brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.0-1.5)	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	
CHAIN LOCKERS					
		SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc	3.0-4.0	4
CONDENSATION, SPACE SUBJECTED TO					
	I	SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant (5.0 wet film thickness) 3) Extended Vermiculite ASTM C-516 (apply while previous coat is still wet) 4) DOD-E-24607 Chlorinated Alkyd Fire Retardant 5) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 - - 1.0-2.0 1.0-2.0	5
	II		1) High Build Epoxy 2) Ceramic Insulation Coating 3) Ceramic Insulation Coating	5.0-6.0 10.0-15.0 10.0-15.0	

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
DECKPLATES					
Deckplates, Steel		<u>Underside and edges:</u> SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-2.5) <u>Top (unpainted):</u> Wire Brush	1) Inorganic Zinc 1) Coat with lube oil weekly and wipe off excess	3.0-4.0	4
Deckplates, Stainless Steel/ Aluminum			Do not paint		
DECKS, METAL INTERIOR AND NON-SKID AREAS					
Steel and Aluminum Decks - wet areas, food preparation areas, exit areas, and areas subject to condensation		<u>Steel:</u> SSPC-SP 11 (1.0) - and - <u>Aluminum:</u> Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	16
Steel and Aluminum Decks - dry areas and low wear areas		<u>Steel:</u> SSPC-SP 3 - and - <u>Aluminum:</u> Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 2.0-3.0	16
Metal Decks, Non-Skid Tread		<u>Steel:</u> SSPC-SP 11 (1.0) - and - <u>Aluminum:</u> Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) MIL-D-17951 Tread Material	-	16
DOOR, JOINER					
	I	<u>Steel:</u> SSPC-SP 3 - and - <u>Aluminum:</u> Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	4

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
	II	Same as Option I	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant 3) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 1.0-2.0 1.0-2.0	
ELECTRIC CABLE, ARMORED					
	I	Clean with Adhesion Promoter/Cleaner. Break gloss with sandpaper as required.	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	4
	II	Same as Option I	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant 3) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 1.0-2.0 1.0-2.0	
ELECTRONICS EQUIPMENT					
Electronics Equipment					6
FURNITURE AND GALLEY EQUIPMENT					
	I	<u>Steel</u> : SSPC-SP 3 - and - <u>Aluminum</u> : Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	4, 7
	II	Same as Option I	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant 3) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 1.0-2.0 1.0-2.0	
INACCESSIBLE AREAS					
Inaccessible Areas, Steel	I	SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-2.5)	1) Inorganic Zinc	3.0-4.0	4, 8

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
	II	Same as Option I	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	
Inaccessible Areas, Galvanized Steel and Aluminum		Roughen mechanically or brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.0-1.5)	1) High Build Epoxy 2) High Build Epoxy	5.0-6.0 5.0-6.0	8
INSULATION SURFACES					
Insulation Surfaces, Fiberglass Sheet/ Closed Cell PVC Foam	I	Clean with Adhesion Promoter/Cleaner. Break gloss with sandpaper as required.	1) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	1.0-2.0 1.0-2.0	4
	II	Same as Option I	1) DOD-E-24607 Chlorinated Alkyd Fire Retardant 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant	1.0-2.0 1.0-2.0	
LADDERS, STAINLESS STEEL, GALVANIZED STEEL AND ALUMINUM					
			Do not paint		
MACHINERY, INTERIOR					
Machinery, Operating Temperatures Under 200°F, Unmachined surfaces		<u>Steel</u> : SSPC-SP 3 - and - <u>Aluminum</u> : Power tool clean using non-metallic abrasive padding, to remove all coatings and contamination	1) High Build Epoxy 2) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 2.0-3.0	9
Machinery, Steel, Operating Temperatures Over 200°F		SSPC-SP 3	1) TT-P-28 Heat Resisting Aluminum Paint 2) TT-P-28 Heat Resisting Aluminum Paint	1.0-2.0 1.0-2.0	9
PIPING, INTERIOR					
Piping, Insulated and Uninsulated, Under 200°F		SSPC-SP 3	1) High Build Epoxy 2) MIL-PRF-24635 Silicone Alkyd, Type II, Cl. 1	5.0-6.0 2.0-3.0	
Piping, Uninsulated, Over 200°F		SSPC-SP 3	1) TT-P-28 Heat Resisting Aluminum Paint 2) TT-P-28 Heat Resisting Aluminum Paint	1.0-2.0 1.0-2.0	

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
PLASTIC SURFACES					
		Lightly roughen; all extraneous matter shall be removed by washing with Adhesion Promoter /Cleaner. Glazed surfaces shall be sanded to promote adhesion.	1) High Build Epoxy 2) High Build Epoxy	Mist Coat 2.0-3.0	
TANKS AND VOIDS					
Tanks and Voids, General		SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) MIL-PRF-23236 General Use - Fuel and Salt Water (Type IV, Grade A/B) 2) MIL-PRF-23236 General Use - Fuel and Salt Water (Type IV, Grade A/B)	5.0-6.0 5.0-6.0	10, 11, 14
Ballast Tanks	I	SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) MIL-PRF-23236 General Use - Fuel and Salt Water (Type IV, Grade A/B) 2) MIL-PRF-23236 General Use - Fuel and Salt Water (Type IV, Grade A/B)	5.0-6.0 5.0-6.0	10, 11, 14
	II	Same as Option I	1) MIL-PRF-23236 Salt Water Only (Type IV, Class 2, Grade A/B) 2) MIL-PRF-23236 Salt Water Only (Type IV, Class 2, Grade A/B)	5.0-6.0 5.0-6.0	
	III	Same as Option I	1) Primer: MIL-PRF-23236 Salt Water Only, 100% Solids, Edge-Retentive (Type IV, Class 2, Grade A/B) 2) Topcoat: MIL-PRF-23236 Salt Water Only, 100% Solids, Edge-Retentive (Type IV, Class 2, Grade A/ MIL-PRF-23236 Grade A when storing, applying, and curing at a temperature range of 20 to 50 degrees F.B)	Follow Manuf. Instructions	
Fuel/JP-5 Tanks, Service, Storage, Overflow, Drain		SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) MIL-PRF-23236 General Use - Fuel and Salt Water (Type IV, Grade A/B) 2) MIL-PRF-23236 General Use - Fuel and Salt Water (Type IV, Grade A/B)	5.0-6.0 5.0-6.0	10, 11, 14
Grey Water, Sewage, and CHT Tanks		SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5)	1) MIL-PRF-23236 General Use - Fuel and Salt Water (Type IV, Grade A/B) 2) MIL-PRF-23236 General Use - Fuel and Salt	5.0-6.0 5.0-6.0	10, 11, 14

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
			Water (Type IV, Grade A/B) -or- 1) MIL-PRF-23236 Salt Water Only (Type IV, Class 2, Grade A/B) 2) MIL-PRF-23236 Salt Water Only (Type IV, Class 2, Grade A/B)	5.0-6.0 5.0-6.0	
Lube Oil and Fuel Tanks, Unballasted with Water Extraction Systems		For new construction, remove mill scale with steel shot	Apply a heavy coat of lube oil		
Potable Water Tank		<u>Steel</u> : SSPC-SP 10/NACE No. 2 using grit conforming to MIL-A-22262 / (1.5-3.5) <u>Aluminum</u> : Brush blast to bare metal with clean, fine aluminum oxide, garnet or equivalent inert material conforming to A-A-59316, Type I & IV / (1.5-2.5)	Potable Water Tank Coating-NSF Approved (See manufacturer's product data sheets for number of coats to achieve total specified DFT) - or - Potable Water Tank Coating-NEHC Approved (three contrasting coats required)	10.0-12.0 (Total) 8.0-12.0 (Total)	12, 13
TRANSDUCER HULL RINGS					
Interior Surfaces		Same surface preparation as the Bilge	Use the same coating system as the Bilge		
WOOD, INTERIOR					
Wood, Painted Interior	I	Remove any loose paint by scraping, sanding, or milling the surface. Apply commercial wood paste filler as necessary to fill dents, holes, and cracks. Allow 18 hrs for drying.	1) High Build Epoxy 2) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A 3) MIL-PRF-24596 Water Based Fire Retardant, Type I, Class 1, Grade A	5.0-6.0 1.0-2.0 1.0-2.0	
	II	Same as Option I	1) High Build Epoxy 2) DOD-E-24607 Chlorinated Alkyd Fire Retardant 3) DOD-E-24607 Chlorinated Alkyd Fire Retardant	5.0-6.0 1.0-2.0 1.0-2.0	

Area or Compartment to be Finished	Option	Surface Preparation / (Anchor Profile in mils)	Coating System	Min DFT (mils)	Notes
Wood, Stained and Varnished Interior		Remove varnish as necessary by scraping or sanding. Sand surface smooth, wipe clean.	1) TT-S-711 Interior Wood Stain 2) A-A-1800 Spar Varnish 3) A-A-1800 Spar Varnish 4) A-A-1800 Spar Varnish	- 1.0-2.0 1.0-2.0 1.0-2.0	

Notes

1. Bilges susceptible to ballast damage shall be coated with 20 mils of Amercoat 238 or equivalent abrasion resistant epoxy tank coating from MIL-PRF-23236.
2. **Intumescent coatings are no longer considered to be an acceptable substitute for currently used fire insulation. They are no longer required to be used on either insulated or uninsulated sides of fire zone bulkheads. Insulated sides of firezone bulkheads shall continue to be protected by fire insulation as directed by the Naval Engineering Manual, COMDTINST M9000.6 (series). All other areas previously specified to be coated with intumescent paint shall no longer require intumescent paint. These areas shall be coated to match their surrounding areas when re-coating is required. Intumescent paint must be removed in any area where it is incompatible with newly applied coatings.**
3. Paint aluminum only as required to prevent corrosion. Always prime aluminum before painting to avoid paint failure.
4. Water-based coatings may only be applied when ambient air and substrate temperature are above 50 degrees F., in order for the water to evaporate completely and form a continuous coating. Water-based coatings will not dry at relative humidity above 80 percent.
5. These coating systems shall not be used to replace thermal or anti-sweat insulation on any piping systems.
6. In general, electronics equipment shall not be painted in the field. Minor touch ups of exposed surfaces may be made using the instructions provided in the equipment technical or service manual. Paint of original matching color shall be used. Information on the proper paint and color can be obtained from the manufacturer. In cases where the equipment requires complete repainting, arrangements shall be made with the servicing MLC Electronics Support Unit.
7. Corrosion resistant steel furniture and galley equipment, decorative plastic surfaces such as those on table tops, porcelain surfaces and interior bright aluminum furniture and galley equipment are not to be painted.
8. All inaccessible voids that bear against the shell shall be welded tight, tested for tightness, and treated by filling and draining with a rust preventive compound conforming to MIL-C-16173, Grade 3. These include rudders, skegs, sealed void spaces at the stem and voids in the bilges or voids constantly exposed to salt water.

9. Working metal surfaces shall not be painted. They shall be coated with a Solvent Cutback Corrosion Preventive Compound, MIL-C-16173, Grade 3, or Thin Film Corrosion Preventive Compound, MIL-C-81309, Type II, Class 1.
10. Drying times between coats and final system cure for specified tank coatings other than potable water tanks shall be in accordance with manufacturer's recommendations.
11. Use a coating system qualified to MIL-PRF-23236 Grade A when storing, applying, and curing at a temperature range of 20 to 50 degrees F. Use a coating system qualified to MIL-PRF-23236 Grade B when storing, applying, and curing at a temperature range of 51 to 100 degrees F.
12. All potable water tank coatings must be approved by either the National Sanitation Foundation (NSF) or Naval Environmental Health Center (NEHC).
13. Drying time between coats for potable water tank coatings, including stripe coat, shall be not less than 24 hours at a minimum temperature of 77 degrees F. Final system curing prior to putting tanks back in service shall be not less than 7 days at a minimum temperature of 77 degrees F.
14. Stripecoat is required on all edges, welds, corners, crevices, etc. after the initial primer coat.
- 15. Option I - Bilge Epoxy Coating System Primer/Topcoat is the best performing system and shall be used for all new construction. Due to a short pot life, optimal application of the Bilge Epoxy Coating System Topcoat is done using plural component spray equipment and is not recommended for application outside of an industrial level activity. Option II with two coats of Bilge Epoxy Coating System Primer should be used at unit and intermediate maintenance level activities where plural component spray equipment is not available. Use Option III with two coats of High Build Epoxy when moisture tolerance is not required and High Build Epoxy systems have performed adequately in the past.**
- 16. Steel decks subject to abuse like cargo holds may be coated with inorganic zinc (see Note 4) as specified for chain lockers.**

APPENDIX C. COATINGS AUTHORIZED FOR USE ON CUTTERS AND BOATS

A. Paint and Coating Approval Procedures.

1. Ships operated by the United States Coast Guard may experience operating conditions significantly more demanding than those seen by their Navy or commercial counterparts. Coatings that perform suitably in those applications may fail prematurely in CG service, leading to excessive recoating and maintenance costs. For these reasons, the CG has established its own list of approved coatings, and this list is included in Section 5 of this Appendix C. The CG accepts military specification (mil spec) and Qualified Products List (QPL) coatings for those applications and areas where their past performance has been acceptable. However, constant advances in coating technology create new, high-performance coatings that are likely to produce significant performance enhancement and/or cost savings. Therefore the CG has also approved commercial coatings for those applications and areas where Mil-Spec/QPL coatings have not performed well, and has placed them on the list of approved coatings.

2. All requests from manufacturers for coating approvals shall be directed to the Office of Naval Engineering (G-SEN) for approval. The address is:

Commandant (G-SEN)
United States Coast Guard
2100 Second Street SW
Washington, DC 20593

3. Requests for approval shall be for complete systems, from the first coating on the substrate to the topcoat. If the requesting manufacturer does not produce all of the required components for a system, acceptable products from other manufacturers should be listed. Requests from manufacturers for coating approvals shall be submitted in writing and shall include:
 - a. A point of contact within the company, including title, street address, phone, fax, and e-mail.
 - b. A brief description of the system, e.g., the intended use of the coating system, the number of separate coatings, and for each coating its name, chemical type, requirements for surface preparation, mixing, application, and thickness, and the minimum and maximum times for drying, intervals between coats, and recoating.
 - c. A Product Data Sheet for each of the coatings in the coating system.
 - d. A Material Safety Data Sheet for each of the coatings in the coating system.
 - e. Other federal approvals of the system or its components, such as mil spec. QPL, U. S. Maritime Administration (MARAD), or Military Sealift Command (MSC).
 - f. Additional relevant information, such as state and local approvals and certifications, and results of laboratory and accelerated tests.
4. The following are requirements for all coatings in CG service:
 - a. EPA registration for antifouling coatings.

- b. Approval from the Naval Environmental Health Center (NEHC), Norfolk, VA or from NSF International (formerly the National Sanitation Foundation), Ann Arbor, MI for potable water tank coatings.
 - c. Volatile Organic Content (VOC) limits of 400 grams/Liter for antifouling coatings and 340 g/L for all other coatings.
- 5. The following are banned from CG service.
 - a. Coatings containing lead. (Lead-free is defined in 16 CFR 1303-Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint as 0.06% or less lead by weight in the dry paint film.)
 - b. Coatings containing coal-tar derivatives.
 - c. Coatings containing hexavalent chromium compounds, for example, zinc chromate and other chromates.
 - d. Antifouling coatings containing organotin compounds, for example, tributyl tin (TBT).
 - e. Coatings containing asbestos.
- 6. Written notice of product approval will be sent to the manufacturer's point of contact, and to the Coast Guard Maintenance Logistics Centers. The product will be added to the list of approved coatings in the next revision of this Manual.
- 7. Approvals are subject to revocation should it be determined that the coating is not performing satisfactorily.
- 8. Manufacturers are advised that all laboratory testing shall be the manufacturer's responsibility and cost. The CG reserves the right to send a representative to any test site to inspect test panels, test setups, test equipment, data sheets, etc. at any time during test periods.
- B. Approval for Reformulated Products. When a manufacturer reformulates a product previously approved by the CG, the manufacturer shall submit, in addition to the data stipulated in section C.1.c above, a letter explaining what has been changed and the reasons for the change. The CG will determine what steps will be necessary to extend approval. A reformulated coating must have a different product name or number than the originally approved product.
- C. Approval for Renamed Products. When a manufacturer renames a product previously approved by the CG, and the change is in name or number only, not composition, the CG will extend approval to the product under its new name, provided that the manufacturer:
 - 1. Submits written notification to the CG of the change in name or number.
 - 2. Warrants that the formulation has not changed.
 - 3. Submits the data required by section C.1.c.

D. Generic Material Class Performance Requirements.

1. Adhesion Promoter/Cleaner. A water-based alkaline cleaner for use in preparation for painting. It is intended for use on fiberglass and closed-cell polyvinyl chloride (PVC) insulation, painted and plastic surfaces, and bare metal. An equivalent material to the products specified herein shall meet the following criteria:
 - a. Water-based cleaner.
 - b. Promotes adhesion between substrate and paint and between coats of paint.
 - c. Contains no phosphates, halogens, chlorinated solvents or petroleum distillates, and is biodegradable.
 - d. Leaves no residue when rinsed with fresh water.
2. Anti-Abrasion Coating, Ice Breaker, Salt Water <350' and Fresh Water. A coating with extremely high resistance to abrasion that is intended for use on the bow and forward portions of icebreaker hulls and is suitable for use in salt and fresh water. An equivalent coating to the products specified herein shall meet the following criteria:
 - a. Proven record (at least three years) of usage as an underwater coating for non-polar icebreakers.
 - b. Abrasion resistant, anti-corrosive epoxy, with a minimum of 50% solids.
 - c. Available in a minimum of two colors, one of which must be red.
 - d. Applicable in a minimum of two coats, with a total thickness of not less than 14 mils mean dry film thickness.
 - e. Other salient characteristics:
 - (1) Abrasion resistance, Taber (ASTM D4060, 1 kg, CS-17 wheel): 50 mg weight loss max.
 - (2) Adhesion, Elcometer (ASTM D4541): 1000 psi min.
3. Anti-Abrasion Coating, Ice Breaker, Salt Water >350'. A coating with unusually high resistance to abrasion that is intended for use on the bow and forward portions of polar icebreaker hulls. It will have low adhesion to ice and low frictional resistance. An equivalent coating to the products specified herein shall meet the following criteria:
 - a. Proven record (at least three years) of usage as an underwater coating for polar icebreakers.
 - b. Can operate in temperatures as low as -60 degrees F.
 - c. Abrasion resistant, anti-corrosive epoxy, with a minimum of 90% solids.
 - d. Available in a minimum of two colors, black and red.
 - e. Applicable in a single coat with a total thickness greater than 30 mils mean dry film thickness.

4. Antifoulant, Non-copper. An antifouling coating that contains biocides for prevention of marine growth and is compatible with aluminum hulls. An equivalent coating to the products specified herein shall meet the following criteria:
 - a. Received EPA registration.
 - b. Contains no materials that can cause galvanic corrosion of aluminum.
 - c. Has a proven record (at least two years) of use as an underwater aluminum hull coating system.
 - d. Has equal or better resistance to mechanical damage from blunt objects than conventional antifouling systems.
5. Bilge Epoxy Coating System. An anti-corrosive epoxy coating system for application in bilges and forepeaks with a primer that can be applied to wet or damp surfaces and an edge retentive topcoat. An equivalent coating system to the products specified herein shall meet the following criteria:
 - a. Applicable by brush, roller, or spray.
 - b. No dew point restrictions - applicable at relative humidity of 10% to 100%.
 - c. It can be applied on waterjetted surfaces with minimum conditions as follow:
 - a. SSPC-SP 12/NACE No. 5
 - i. Visual Surface Preparation: WJ-3
 - ii. Nonvisual Surface Preparation: SC-2
 - b. SSPC-VIS 4/NACE VIS 7: Moderate Flash Rusting (M)
 - d. Essentially 100% solids and few or no VOCs (< 20 mg/l).
 - e. Edge retentive.
 - f. Non-flammable.
 - g. Good chemical resistance.
 - h. Proven record (a minimum of two years) of use as a bilge/forepeak system.
6. Fouling Release System. A nontoxic coating for boat hulls that resists attachment of fouling. The coating has a low-energy surface, and its primary mechanism for releasing fouling does not rely on dissolving, polishing, eroding, or reducing in thickness. An equivalent coating to the products specified herein shall meet the following criteria:
 - a. The coating, applied and cured as directed by the manufacturer, shall be allowed to foul for 30 days in subtropical waters. When exposed to flowing seawater at 22 knots for 30 minutes, the coating shall release at least 80% of the settled fouling. The area covered by residual fouling shall be measured and recorded. This cycle shall be repeated six times. At the conclusion of each cleaning, the area covered by residual fouling shall not be greater than at any previous cleaning.
 - b. Have received EPA concurrence that registration is not required.

- c. Easily cleaned by low pressure washing (<1000 psi) or by light wiping with sponges or soft cloth.
- 7. High Build Epoxy. A two-component epoxy coating intended for general use as an all-purpose high-performance coating that is qualified for use under MIL-PRF-23236 or as an anticorrosive under MIL-PRF-24647. All colors are authorized for general use.
- 8. High Turbulence Coating. A coating that resists removal under turbulent conditions which is used as a topcoat to protect against cavitation erosion on appendages of the underwater body of ships, especially structures aft of the propeller such as the rudder, struts and fins. An equivalent coating to the products specified herein shall meet the following criteria:
 - a. Proven record (a minimum of three years) of use as a coating system for high turbulent/cavitation-prone surfaces.
 - b. Other salient characteristics:
 - (1) Maximum rate of cavitation erosion (modified ASTM G32): 40 micrometers/hour
 - (2) Nominal incubation time (modified ASTM G32): 30 minutes minimum
- 9. Inorganic Zinc. A self-curing, inorganic zinc-rich primer for use on properly prepared steel surfaces. This high-solids, VOC-compliant, inorganic zinc-rich primer protects steel galvanically and halts sub-film corrosion. When damaged, it continues to protect the underlying steel by cathodic protection. It will withstand severe weather conditions and aggressive exposures. This primer may be top-coated or used without topcoat, for instance, on buoy decks. An equivalent coating to the products specified herein shall meet the following criteria:
 - a. Although optimal relative humidity may be higher, the coating must be able to cure at a relative humidity down to 50%.
 - b. Other salient characteristics:
 - (1) Color: Gray (Green-Gray is acceptable)
 - (2) Metallic zinc content: 80% minimum by weight in dry film
 - (3) Adhesion (ASTM D4541): 1000 psi min
 - (4) Flexibility: No cracks when bent 180° over a 1-inch mandrel
 - (5) Impact resistance (ASTM D2764): 60 inch-pounds min.
- 10. Inorganic Zinc, Modified. A self-curing, inorganic zinc-rich primer for use on properly prepared steel surfaces. This high-solids, VOC-compliant, inorganic zinc-rich primer protects steel galvanically and halts sub-film corrosion. When damaged, it continues to protect the underlying steel by cathodic protection. It will withstand severe weather conditions and aggressive exposures. This primer must be top-coated. An equivalent coating to the products specified herein shall meet the following criteria:
 - a. It can be applied on waterjetted surfaces.

- b. Other salient characteristics:
 - (1) Metallic zinc content: 50% minimum by weight in dry film
 - (2) Adhesion (ASTM D4541): 1000 psi min
 - (3) Flexibility: No cracks when bent 180° over a 1-inch mandrel
 - (4) Impact resistance (ASTM D2764): 60 inch-pounds min.
11. Organic Zinc. An epoxy-type anticorrosive primer for use on properly-prepared steel surfaces exposed to severe industrial or marine environments. This primer must be top-coated to attain maximum protective qualities. An equivalent coating to the products specified herein shall meet the following criteria:
- a. Applicable by brush, roller, or spray.
 - b. Other salient characteristics:
 - (1) Metallic zinc content: 80 % by weight minimum in dry film
 - (2) Adhesion (ASTM D4541): 1000 psi min.
 - (3) Flexibility: No cracks when bent 180° over a 1-inch mandrel
 - (4) Impact resistance (ASTM D2764): 60 inch-pounds min.
 - (5) Surface tolerance: Manufacturer will warrant performance on surfaces cleaned by water-jet to WJ-2 and SC-2 standards
12. Polysiloxane System. Topside coating system featuring a durable polysiloxane coating with superior gloss and color retention that is used as the topcoat for exterior applications. On steel, the polysiloxane system consists of the polysiloxane topcoat that is applied to a zinc rich primer, a zinc rich primer with an epoxy mid-coat, an epoxy primer, or direct to metal. A coating equivalent to the polysiloxane topcoat products specified herein shall meet the following criteria:
- a. It can be applied to bare or primed steel, galvanized steel, aluminum, epoxy primer, glass reinforced plastic, organic zinc primer, and inorganic zinc silicate primer.
 - b. Can be applied by brush, roller, or spray.
 - c. Other salient characteristics:
 - (1) Elongation (ASTM D522): 10 % minimum
 - (2) Impact resistance (ASTM D2794): 80 inch-pounds min.
 - (3) Adhesion (Elcometer, ASTM D4541): 1600 psi min.
 - (4) Taber Abrasion (ASTM D4060, CS-17 wheel, 1 kg load, 1000 cycles): 90 mg max.

- (5) 60° Gloss retention (2000 hrs QUV): 10 gloss units max. Color change (1000 hours QUV): 3 CIELAB units max.

13. Potable Water Tank Coating. An epoxy-type coating suitable for use in tanks and pipes that contain drinking water. The coating is also suitable for use in food processing facilities. An equivalent coating to the products specified herein shall meet the following criteria:

1. The coating must be certified to meet the current National Primary and Secondary Drinking Water Regulations issued by the US Environmental Protection Agency. The coating shall be certified by the Naval Environmental Health Center (NEHC), Norfolk, VA or by NSF International (formerly the National Sanitation Foundation), Ann Arbor, MI.

2. Other salient characteristics:

- (1) Adhesion (ASTM D4541): 500 psi minimum
- (2) Abrasion resistance (ASTM D4060, CS 17 wheel, 1 kg weight, 1000 cycles): 200 mg maximum
- (3) Chemical resistance (ASTM D714): No deterioration in 20% sodium hydroxide, 3% sodium chloride, 3% sulfuric acid, and gasoline (nonmethanol)
- (4) Material extracted by drinking water: Certification to ANSI/NSF Std 61

14. Rust Deoxidizing Primer. A primer for temporary repair of steel when optimum surface preparation is not practical. The primer encapsulates existing rust and delays formation of additional rust. An equivalent coating to the products specified herein shall meet the following criteria:

a. Serving as a primer, it must be compatible with High Build Epoxy and Polysiloxane.

b. Other salient characteristics:

- (1) Recoat time: At least 18 hours at 25 °C
- (2) Service life: Six months minimum

15. Slip Resistant Sheets. Slip resistance is provided by sheets of abrasive particles held in a tough, durable binder to a film backing. The reverse side is covered with a pressure-sensitive adhesive and a removable protective liner. The self-adhesive sheets are used with an edge sealer on properly-primed steel or aluminum exterior surfaces on cutters and boats to provide traction to men and equipment under wet and dry conditions. An equivalent self-adhesive material to the products specified herein shall meet the following criteria:

a. Color: Black

b. Adhesion (MIL-PRF-17951)

- (1) Shear strength (7 days aging) 10 pounds minimum
- (2) Strip strength: 0.75 pounds minimum

c. Minimum coefficient of friction (MIL-PRF-17951)

- (1) Static (Rubber): 1.2 dry, 1.2 wet, 0.9 oily
- (2) Static (Leather): 1.1 dry, 1.1 wet
- (3) Dynamic (Rubber): 1.2 dry, 1.2 wet, 0.8 oily
- (4) Dynamic (Leather): 0.9 dry, 1.1 wet
- (5) Service Life: 30 months
- (6) Proven record (a minimum of two years) of use as a slip resistant system for ship/boat weather decks operating in rough ocean seas.

E. CG Approved Coatings/Materials.

1. Generic Categories

General Material Class	Coating	FED-STD-595 Color
ADHESION PROMOTER/CLEANER (Use following or similar material.)		
	Ameron Prep 88	-
ANTI-ABRASION COATING, ICEBREAKER, SALT WATER <350' AND FRESH WATER		
	Ameron Amerlock 400	Gray / Red
	Ameron Amercoat 238	Black / Red
	International Intershield 350 (KZA 350/KZA 352 / KZA 351) – (For immersed areas, the first coat must be KZA 350-Silver Gray)	Silver Gray / Black / Red
ANTI-ABRASION COATING, ICEBREAKER, SALT WATER >350'		
	International Intershield 163 Inerta 160 (ERA163/ERA 160)	Black / CG Red
ANTIFOULANT, NON-COPPER		
	E Paint SN-1	Black / White / Gray
	NSNs: 8010-01-505-4219 1 Gal. GL 8010-01-505-4221 5 Gal. CN	Black
	8010-01-505-4223 1 Gal. GL 8010-01-505-4224 5 Gal. CN	White
	8010-01-505-4225 1 Gal. GL 8010-01-505-4226 5 Gal. CN	Gray
ANTI-SEIZE COMPOUND (MIL-T-22361 may also be used.)		
	Ultra Safety Systems Ultra Tef-Gel (NSN: 8030-01-450-4009 / 1.0 oz / EA)	-
BILGE EPOXY COATING SYSTEM		
Primer	Euronavy Eurobasic ES301K (Temp. >59 deg F) - or - Euronavy Eurobasic ES301L (Temp. from 41-59 deg F)	Light Gray, Dark Gray, Red Oxide, Light Green (White can only be used as topcoat, not as a primer)

General Material Class	Coating	FED-STD-595 Color
Topcoat	Euronavy EuroGuard ES301S (Not recommended for application at unit or intermediate maintenance level activities due to short pot life.)	Light Grey, Red Oxide
CERAMIC INSULATION COATING		
	Span-World Temp-Coat Type "F"	White
POLYSILOXANE		
	Ameron PSX-700	Various
FOULING RELEASE SYSTEM		
	International Intersleek System	
	Intergard (FPL 274-FPA 327 / FPJ 034-FPA 327)	Red / Gray
	Intersleek Tie Coat BXA 386/BXA 390/BXA 391	Gray
	Intersleek Finish BXA 819/BXA820/BXA 821	Black
HIGH BUILD EPOXY (General purpose epoxies from MIL-PRF-24647 anti-corrosives and MIL-PRF-23236)		
	Ameron Amercoat 230	Various
	Ameron Amercoat 235	Various
	Ameron Amercoat 236	Various
	Ameron Amercoat 385	Various
	Hempel Hempadur 4514	Various
	Hempel Hempadur 4515	Various
	International Intergard (264) FP Series	Various
	International Intertuf (262) KH Series	Various
	Sherwin-Williams Duraplate 235 B67-235 Series/B67V235	Various
	Sherwin-Williams Epoxy P23 Series/P23VQ80	Various
HIGH TURBULENCE COATING		
	Ameron Amercoat 238	Black / Red
	Ameron Amerlock 400	Black / Red
	Hempel Hempadur MultiStrength 35530	Black / Red
	Somay Hycote 151 Epoxy (Can be applied underwater)	Black / Red
	Somay Hycote 165 Epoxy	Black / Red
	International Interzone 1000	Black / Red
	Jotun Marathon 4000 Series	Black / Red
INORGANIC ZINC (DOD-P-24648 inorganic zinc may also be used)		
	Ameron Dimetcote 9HS	Green
	Hempel Galvosil 1568-19830	Gray
	Sherwin-Williams Zinc Clad IIHS B69VZ1/ B69VZ3/B69D11	Gray-Green
INORGANIC ZINC, MODIFIED		
	Ameron Dimetcote 302H	Green
ORGANIC ZINC		
	Ameron Amercoat 68HS	Red-Gray
	Hempel Hempadur 1736-19830	Red-Gray
	International Interzinc 75V (EPA075V)	Red
	Jotun Barrier MZ-4 / V13F4	Yellow-Green

General Material Class	Coating	FED-STD-595 Color
	Sigma Sigmacover Zinc Primer II 7402	Red-Brown
PAINT REMOVER/STRIPPER (Use following or similar material.)		
	Dumond Chemical, Inc. Peel-Away 7	-
POLYSILOXANE SYSTEM		
Zinc Rich Primer		
	Ameron Dimetcote 302H	Green
Epoxy Primer/Mid-Coat		
	Ameron Amerlock 2 (Temp. <90 deg F)	Various
	Ameron Amerlock 400 (Temp. >90 deg F)	Various
Polysiloxane		
	Ameron PSX-700FD(Faster Dry Cure - Temp.<90 deg F)	Various
	Ameron PSX-700 (Standard Cure - Temp. >90 deg F)	Various
POTABLE WATER TANKS (Must be NSF or NEHC approved)		
	Ameron Amercoat 133 (NSF approved \geq 1000 gal. with 10 day cure) (NSF approved \geq 50 gal. with 14 day cure)	Off-white/Red
	Ameron Amercoat 233ER (NSF approved \geq 1000 gal.)	Buff/Light Blue/Off-White
	Ameron Amerlock 400 (NSF approved \geq 1000 gal.)	Ivory/ Medium Gray/ RT-1805 Blue/ White
	Ameron Amerlock 2 (NSF approved \geq 1000 gal.)	Ivory/ Medium Gray/ RT-1805 Blue/ White
	International 5747/5748 (Primer) (NEHC approved) International 5753/5754 (Topcoat)	Green White
	International Interseal 670HS (NSF approved \geq 100 gal. with 14 day cure)	White LTC/Buff LTC/White/SPX Blue/Buff/Black LTC/Black/Blue LTC
	Sherwin-Williams (NEHC approved) Tankguard No. 1 N11G100/N11V100 Tankguard No. 3 N11W100/N11V102	Green White
	Sherwin-Williams Dura-Plate 235 (NSF approved \geq 1000 gal.)	Buff/ Off-White
	Sherwin-Williams Dura-Plate UHS Primer: B62H210 with B62V210 or B62V211 cure Topcoat: B62W210 with B62V210 or B62V211 cure	Gold White
RUST DEOXIDIZING PRIMER (Use following or similar material.)		
	Total Rust and Corrosion Control RDP (NSN: 8030-01-356-8690 / 5 gal / CO)	-
SLIP RESISTANT SHEETS		
	3M Safety-Walk 710 Coarse Slip Resistant Surfacing (authorized for all cutters and boats)	Black
	3M Safety-Walk 610 General Purpose Slip Resistant Surfacing (authorized for maintenance of existing 610 systems only)	Black
	3M Safety-Walk Primer	-
	3M Safety-Walk Edge Sealing Compound No. 5569	-
SYNTHETIC WOOD FINISH (Use following or similar material.)		
	Akzo Nobel Sikkens Cetol Marine	Satin

General Material Class	Coating	FED-STD-595 Color
	Akzo Nobel Sikkens Cetol Marine Gloss	Gloss Overcoat
	Flood Deks Olje #1	Matte
	Flood Deks Olje #2	Gloss Overcoat

2. Military/Federal Specification. Although National Stock Numbers are provided for convenience, any products that are listed on the Qualified Products List (QPL) for a given military/federal specification may be used. If there is no QPL for a given military/federal specification, any product certified as meeting all requirements of that specification may be used.

MIL-SPEC	Coating	FED-STD-595 Color	National Stock No.	Quantity	U/I
TT-P-28 ALUMINUM HEAT RESISTING PAINT					
	1200°F nominal	Aluminum	8010-01-344-5121	1.0 gal	GL
	1200°F nominal	Aluminum	8010-01-344-5122	5.0 gal	CN
TT-R-248 PAINT AND LACQUER REMOVER, SOLVENT TYPE					
		-	8010-00-943-7128	1.0 gal	GL
		-	8010-00-515-2258	5.0 gal	CN
TT-F-340 PLASTIC WOOD FILLER					
		Natural	8030-00-262-9171	4.0 oz	CN
		Natural	8030-00-262-9171	1.0 lb	LB
		Light Mahogany	8030-664-7088	4.0 oz	CN
		Walnut	8030-664-7088	4.0 oz	CN
TT-E-489 ALKYD GLOSS ENAMEL (MIL-E-24635 does not have NSNs for all required colors. TT-E-489 can be used as a substitute for MIL-E-24635 in the following colors only)					
	Brown, Gloss	10080	8010-00-598-5470	1.0 qt	QT
	Brown, Gloss	10080	8010-00-286-7737	1.0 gal	GL
	Bright Green, Gloss	14260	8010-000-779-9598	1.0 qt	QT
	Bright Green, Gloss	14260	8010-000-530-5563	1.0 gal	GL
	Bright Green, Gloss	14260	8010-000-616-7490	5.0 gal	CN
	Gold, Gloss	17043	8010-001-040-5786	1.0 qt	QT
	Dark Purple, Gloss	17100	8010-01-040-3761	1.0 qt	QT
TT-S-711 STAIN; OIL TYPE, WOOD, INTERIOR					
		Cherry	8010-00-165-4422	1.0 qt	QT
		Dark Mahogany	8010-00-281-2075	1.0 gal	GL
		Dark Oak	8010-00-165-8628	1.0 qt	QT
		Dark Oak	8010-00-281-2072	1.0 gal	GL
		Dark Walnut	8010-00-281-2076	1.0 gal	GL
		Light Oak	8010-00-597-8226	1.0 qt	QT
		Light Oak	8010-00-166-0746	1.0 gal	GL
		Light Walnut	8010-00-281-2074	1.0 gal	GL
		Mahogany	8010-00-161-7264	1.0 pt	PT
		Mahogany	8010-00-165-8627	1.0 qt	QT
		Maple	8010-00-281-2077	1.0 qt	QT
		Maple	8010-00-598-7669	1.0 gal	GL

		Red Mahogany	8010-00-281-2071	1.0 gal	GL
		Walnut	8010-00-597-8225	1.0 gal	GL
A-A-1800 SPAR VARNISH OIL					
	(TT-V-119 Replacement)	-	8010-00-251-6980	5.0 gal	CN
	(TT-V-119 Replacement)	-	8010-00-597-7856	1.0 gal	GL
	(Low VOC)	-	8010-00-160-5852	1.0 gal	GL
MIL-C-16173 CORROSION PREVENTION COMPOUNDS, SOLVENT CUTBACK, COLD APPLICATION, THIN FILM					
	Grade 3, Soft Film, Water Displacing	-	8030-00-244-1296	1.0 gal	GL
	Grade 3, Soft Film, Water Displacing	-	8030-00-244-1293	5.0 gal	CN
MIL-D-17951 DECK COVERING, LIGHTWEIGHT NONSLIP (TREAD MATERIAL)					
	6.0" Width, 24.0" Length	Black	7220-00-205-0389	-	EA
MIL-R-19907 GLASS REINFORCED PLASTIC LAMINATE (FIBERGLASS) REPAIR KIT					
		-	2090-00-372-6064	-	KT
MIL-T-22361 ANTI-SEIZE THREAD COMPOUND, ZINC DUST-PETROLATUM					
		-	8030-00-292-1102	8.0 oz	TU
MIL-PRF-23236 PAINT COATING SYSTEMS, FUEL AND SALT WATER BALLAST TANKS					
<u>General Use - Fuel and Salt Water (Type IV, Grade A and B)</u>					
	Ameron Amercoat 90HS	-	-	-	-
	Ameron Amercoat 395	-	-	-	-
	Ameron Amercoat 395FD	-	-	-	-
	Ameron Amercoat 395FD w/ 861 Accelerator	-	-	-	-
	Ameron Amercoat 244HS	-	-	-	-
	International Intergard FP Series	-	-	-	-
	International Intergard KB Series	-	-	-	-
	Jotun Valspar Sovapon 264 Series	-	-	-	-
<u>General Use - Fuel and Salt Water (Type IV, Grade B)</u>					
	Ameron Amercoat 236	-	-	-	-
	Esgard Ultraguard 203	-	-	-	-
	Jotun 8F3/8W3	-	-	-	-
	Jotun 550F25/550W3	-	-	-	-
	Jotun 590F25/590W3	-	-	-	-
	Sherwin-Williams N11-100 Series	-	-	-	-
	Sherwin-Williams 5001 Primer/5006 Barrier	-	-	-	-
	Sigma Primer 5470/Finish 5471	-	-	-	-
<u>Salt Water Only (Type IV, Class 2, Grade A and B)</u>					
	Ameron Amercoat 234QC	-	-	-	-
	Ameron Amercoat 235	-	-	-	-
<u>Salt Water Only (Type IV, Class 2, Grade B)</u>					
	Ameron Amercoat 385	-	-	-	-

<u>Salt Water Only, 100% Solids, Edge-Retentive (Type IV, Class 2, Grade B)</u>					
	Sherwin-Williams Primer: Dura-Plate UHS B62H210/B62V210	Gold	-	-	-
	Sherwin-Williams Topcoat: Dura-Plate UHS B62W210/ B62V210	White	8010-01-467-5599	5.0 gal	KT
	Dura-Plate UHS B62G210/ B62V210	Green	8010-01-467-6308	5.0 gal	KT
	Sherwin-Williams Primer: Dura-Plate UHS 235 B67H235/B67V235	Buff	8010-01-467-5526	5.0 gal	KT
	Sherwin-Williams Stripecoat/Topcoat: Dura-Plate UHS B62W210/ B62V210	White	8010-01-467-5599	5.0 gal	KT
	Dura-Plate UHS B62G210/ B62V210	Green	8010-01-467-6308	5.0 gal	KT
	Sherwin-Williams Primer: Seaguard 5001 Epoxy Primer N11-200	Red	8010-01-467-5597	2.0 gal	KT
	Seaguard 5001 Epoxy Primer N11-200	Red	8010-01-467-5598	10.0 gal	KT
	Sherwin-Williams Topcoat: Dura-Plate UHS B62W210/ B62V210	White	8010-01-467-5599	5.0 gal	KT
	Dura-Plate UHS B62G210/ B62V210	Green	8010-01-467-6308	5.0 gal	KT
	Sigma Primer: Sigmaguard BT Primer 5404	Amber	8010-01-470-7107	1.0 gal	KT
	Sigmaguard BT Primer 5404	Amber	8010-01-470-7113	5.0 gal	KT
	Sigma Stripecoat/Topcoat: Sigma Sigmaguard BT 5411-5000	Gray	8010-01-470-8105	1.0 gal	KT
	Sigma Sigmaguard BT 5411-5000	Gray	8010-01-470-7126	5.0 gal	KT
	Sigma Sigmaguard BT 5411-S674	Aqua Green	8010-01-470-8108	1.0 gal	KT
	Sigma Sigmaguard BT 5411-S674	Aqua Green	8010-01-470-8110	5.0 gal	KT
	Sigma Sigmaguard BT 5411-7000	White	8010-01-470-7129	1.0 gal	KT
	Sigma Sigmaguard BT 5411-7000	White	8010-01-470-7124	5.0 gal	KT
DOD-PRF-24176 CEMENT, EPOXY, METAL REPAIR & HULL SMOOTHING					
	Ameron Amercoat 140 Epoxy Repair Compound	Gray	-	-	-
	A. W. Chesterton ARC 10	Gray	-	-	-
	A. W. Chesterton ARC 858	Gray	-	-	-
	Belzona 1311 Ceramic R-Metal	Gray	-	-	-
	Belzona 1111 Super Metal	Gray	-	-	-
	Belzona 1211 E-Metal	Gray	-	-	-
	Chem Seal CS 2725 Epoxy Bonding Compound	Gray	-	-	-
	Enecon Epoxit 6003/403	Gray	-	-	-
	Enecon Metalclad Duralloy	Gray	-	-	-
	Enecon Metalclad CeramAlloy CP	Gray	-	-	-
	International Intergard 822 Epoxy Filler	Red	-	-	-
	ITW Devcon Aluminum Putty F	Aluminum	-	-	-
	ITW Devcon Ceramic Repair Putty	Dark Blue	-	-	-
	ITW Devcon Plastic Steel Putty (A)	Gray	-	-	-
	ITW Devcon Titanium Putty	Gray	-	-	-
	ITW Philadelphia Resins Repair Compound	Blue	-	-	-
	Thortex Cerami-Tech EG	Gray	-	-	-
	Thortex Metal-Tech EG	Gray	-	-	-
MIL-PRF-24596 NONFLAMING FIRE-PROTECTIVE COATING COMPOUNDS					
	Rosewood	22519	8010-01-208-5832	1.0 gal	GL
	Beach Sand	22563	8010-01-206-4712	1.0 gal	GL
	Beach Sand	22563	8010-01-208-7772	5.0 gal	CN

	Sun Glow	23697	8010-01-208-7774	5.0 gal	CN
	Clipper Blue	24516	8010-01-208-1775	1.0 gal	GL
	Clipper Blue	24516	8010-01-208-7773	5.0 gal	CN
	Pastel Green	24585	8010-01-208-1779	1.0 gal	GL
	Pastel Green	24585	8010-01-208-1780	5.0 gal	CN
	Pastel Blue	25526	8010-01-208-7776	1.0 gal	GL
	Pastel Blue	25526	8010-01-209-1155	5.0 gal	CN
	Bulkhead Gray	26307	8010-01-208-1781	1.0 gal	GL
	Bulkhead Gray	26307	8010-01-208-7778	5.0 gal	CN
	Yellow Gray	26400	8010-01-208-1777	1.0 gal	GL
	Pearl Gray	26493	8010-01-208-1782	1.0 gal	GL
	Pearl Gray	26493	8010-01-209-3195	5.0 gal	CN
	Green Gray	26496	8010-01-209-1154	1.0 gal	GL
	Green Gray	26496	8010-01-208-1776	5.0 gal	CN
	Soft White	27880	8010-01-208-1778	1.0 gal	GL
	Soft White	27880	8010-01-208-7777	5.0 gal	CN
	Water-based: Ameron Amercoat 601 Davlin Product 270 International Intercryl 451 NCP Mil-PRF-24596 Waterbase Sherwin-Williams Mil-PRF-24596A N41-300 Series	Various Various Various Various Various			
	Solvent-based: International Interlac 537 NCP Mil-PRF-24596 Solvent Based	Various Various			
DOD-E-24607 NONFLAMING INTERIOR CHLORINATED ALKYD ENAMEL					
	Rosewood	22519	8010-01-344-5086	1.0 gal	GL
	Rosewood	22519	8010-01-344-5097	5.0 gal	CN
	Beach Sand	22563	8010-01-344-5085	1.0 gal	GL
	Beach Sand	22563	8010-01-344-5096	5.0 gal	CN
	Sun Glow	23697	8010-01-344-5088	1.0 gal	GL
	Sun Glow	23697	8010-01-344-5099	5.0 gal	CN
	Clipper Blue	24516	8010-01-344-5087	1.0 gal	GL
	Clipper Blue	24516	8010-01-344-5098	5.0 gal	CN
	Pastel Green	24585	8010-01-344-5090	1.0 gal	GL
	Pastel Green	24585	8010-01-344-5101	5.0 gal	CN
	Pastel Blue	25526	8010-01-344-5095	1.0 gal	GL
	Pastel Blue	25526	8010-01-344-5106	5.0 gal	CN
	Bulkhead Gray	26307	8010-01-344-5091	1.0 gal	GL
	Bulkhead Gray	26307	8010-01-344-5102	5.0 gal	CN
	Yellow Gray	26400	8010-01-344-5093	1.0 gal	GL
	Yellow Gray	26400	8010-01-344-5104	5.0 gal	CN
	Pearl Gray	26493	8010-01-344-5094	1.0 gal	GL
	Pearl Gray	26493	8010-01-344-5105	5.0 gal	CN
	Green Gray	26496	8010-01-344-5092	1.0 gal	GL
	Green Gray	26496	8010-01-344-5103	5.0 gal	CN
	Soft White	27880	8010-01-344-5089	1.0 gal	GL
	Soft White	27880	8010-01-344-5100	5.0 gal	CN

	There is no QPL for DOD-E-24607. Use the following or equivalent:				
	Ameron Amercoat 3234	Various			
	Crawford TPD-24607	Various			
	International Interlac 537	Various			
	NCP DOD-E-24607	Various			
	Sherwin-Williams TPD-24607B N41 Series	Various			
MIL-PRF-24635 SILICONE ALKYD ENAMEL [Use following NSNs or procure directly from manufacturer listed on most current QPL-24635-(series).]					
	Brown, Gloss	10080	See TT-E-489		
	Tan, Gloss	10324	8010-01-433-8367	1.0 qt	QT
	Tan, Gloss	10324	8010-01-433-8365	1.0 gal	GL
	Spar, Gloss	10371	8010-01-396-6804	1.0 qt	QT
	Spar, Gloss	10371	8010-01-360-9307	1.0 gal	GL
	Red, Gloss	11105	8010-01-396-6803	1.0 qt	QT
	Red, Gloss	11105	8010-01-396-6798	1.0 gal	GL
	Red, Gloss	11105	8010-01-349-9006	5.0 gal	CN
	International Orange, Gloss	12197	8010-01-360-9306	1.0 gal	GL
	CG Red, Gloss	12199	8010-01-360-9305	1.0 gal	GL
	Orange, Gloss	12246	8010-01-433-8361	1.0 qt	QT
	Orange, Gloss	12246	8010-01-433-8381	1.0 gal	GL
	Yellow, Gloss	13538	8010-01-396-6805	1.0 gal	GL
	Yellow, Gloss	13538	8010-01-349-9005	5.0 gal	CN
	Yellow, Lusterless	33538	See TT-E-489		
	Chartreuse, Semigloss	23814	See TT-E-489		
	Dark Green, Gloss	14062	8010-01-349-9007	5.0 gal	CN
	Bright Green, Gloss	14260	See TT-E-489		
	Light Green, Gloss	14449	8010-01-433-8370	1.0 qt	QT
	Light Green, Gloss	14449	8010-01-433-8369	1.0 gal	GL
	Dark Blue, Gloss	15044	8010-01-433-8371	1.0 qt	QT
	Dark Blue, Gloss	15044	8010-01-433-8374	1.0 gal	GL
	Blue, Gloss	15123	8010-01-396-6797	1.0 qt	QT
	CG Blue, Gloss	15182	8010-01-396-6796	1.0 qt	QT
	CG Blue, Gloss	15182	8010-01-360-9304	1.0 gal	GL
	Light Blue, Gloss	15200	8010-01-433-8382	1.0 qt	QT
	Light Blue, Gloss	15200	8010-01-433-8373	1.0 gal	GL
	Dark Gray, Gloss	16081	8010-01-433-8384	1.0 qt	QT
	Dark Gray, Gloss	16081	8010-01-433-8379	1.0 gal	GL
	Blue Gray, Gloss	16099	8010-01-360-8068	1.0 gal	GL
	Blue Gray, Gloss	16099	8010-01-374-8954	5.0 gal	CN
	Gray, Gloss	16187	8010-01-356-2940	1.0 gal	GL
	Light Gray, Gloss	16376	8010-01-375-2175	1.0 gal	GL
	Black, Gloss	17038	8010-01-350-5239	1.0 gal	GL
	Black, Gloss	17038	8010-01-344-6695	5.0 gal	CN
	Black, Semigloss	27038	8010-01-344-5320	1.0 gal	GL
	Black, Lusterless	37038	8010-01-356-2938	1.0 gal	GL
	Black, Lusterless	37038	8010-01-344-6703	5.0 gal	CN
	Gold, Gloss	17043	See TT-E-489		
	Dark Purple, Gloss	17100	See TT-E-489		
	Purple, Gloss	17142	8010-01-433-8375	1.0 qt	QT
	Purple, Gloss	17142	8010-01-433-8388	1.0 gal	GL
	White, Semigloss	27886	8010-01-382-1810	1.0 gal	GL

	CG White, Gloss	17925	8010-01-397-3935	1.0 gal	GL
	Ameron Amercoat 3203	Various			
	Ameron Amercoat 5410	Various			
	Crawford Mil-E-24635	Various			
	International Interlac 800	Various			
	BLP Mobile Jack Tar Silicone Alkyd Enamel	Various			
	NCP Mil-E-24635	Various			
	Sherwin-Williams Mil-PRF-24635B N40 Series	Various			
MIL-PRF-24647 ANTICORROSIVE AND ANTIFOULING SHIP HULL PAINT SYSTEM					
Anticorrosives					
	Ameron Amercoat 230	Gray	8010-01-419-2430	5.0 gal	KT
	Ameron Amercoat 230	Red	8010-01-270-8161	5.0 gal	KT
	Ameron Amercoat 235	Gray	8010-01-359-5513	1.0 gal	KT
	Ameron Amercoat 235	Gray	8010-01-359-7235	5.0 gal	KT
	Ameron Amercoat 235	Red	8010-01-359-7236	1.0 gal	KT
	Ameron Amercoat 235	Red	8010-01-316-6741	5.0 gal	KT
	Hempel Hempadur 4515-1148	Gray	8010-01-419-2434	5.0 gal	KT
	Hempel Hempadur 4515-5063	Red	8010-01-419-2431	5.0 gal	KT
	Hempel Hempadur 4514-1148 Low Temp	Gray	8010-01-419-2432	5.0 gal	KT
	Hempel Hempadur 4514-5063 Low Temp	Red	8010-01-419-2427	5.0 gal	KT
	International Intergard FPJ034/FPA327 Summer Grade	Light Gray	8010-01-241-9721	5.0 gal	KT
	International Intergard FPL274/FPA327 Summer Grade	Red	8010-01-268-7583	5.0 gal	KT
	International Intergard FPJ034/FCA321 Winter Grade	Light Gray	8010-01-241-9723	5.0 gal	KT
	International Intergard FPL274/FCA321 Winter Grade	Red	8010-01-268-7584	5.0 gal	KT
	International Intertuf KHA302/KHA062 Summer Grade	Gray	8010-01-421-2963	5.0 gal	KT
	International Intertuf KHA303/KHA062 Summer Grade	Red	8010-01-421-2964	5.0 gal	KT
	International Intertuf KHA302/KHA414 Winter Grade	Gray	8010-01-421-2967	5.0 gal	KT
	International Intertuf KHA303/KHA414 Winter Grade	Red	8010-01-421-2966	5.0 gal	KT
	Sherwin Williams P23AQ81/P23VQ80	Gray	8010-01-467-5556	5.0 gal	CN
	Sherwin Williams P23RQ82/P23VQ80	Red	8010-01-467-5555	5.0 gal	CN
	Sherwin Williams P23AQ61/P23VQ80 Low Temp	Gray	8010-01-467-5558	5.0 gal	CN
	Sherwin Williams P23RQ62/P23VQ80 Low Temp	Red	8010-01-467-5557	5.0 gal	CN
Antifoulants					
	Ameron ABC #3	Black	8010-01-210-7812	1.0 gal	GL
	Ameron ABC #3	Black	8010-01-210-7813	5.0 gal	CN
	Ameron ABC #3	Red	8010-01-211-4815	5.0 gal	CN
	Hempel Olympic 7660-1999	Black	8010-01-419-2428	5.0 gal	CN
	Hempel Olympic 7660-5063	Red	8010-01-419-2435	5.0 gal	CN
	International Interviron BRA640	Red	8010-01-339-8708	5.0 gal	CN

	International Interviron BRA642	Black	8010-01-339-8707	5.0 gal	CN
	Sherwin Williams P30BQ12	Black	8010-01-467-5561	5.0 gal	CN
	Sherwin Williams P30RQ10	Red	8010-01-467-5559	5.0 gal	CN
DOD-P-24648 PRIMER COATING, ZINC DUST PIGMENTED (INORGANIC ZINC)					
	Type I, Class 1, Composition B (water-based)	36231	8010-01-350-2068	1.0 gal	KT
	Type I, Class 1, Composition B (water-based)	36231	8010-01-349-8055	4.0 gal	KT
	Water-based:				
	International Interzinc 685	Gray			
	Jotun 13F18 WB-18	Gray			
MIL-PRF-24667 NON-SKID COATING SYSTEM					
	Primers (For use with Type I, II, III, and IV systems)	26008	8010-01-397-3986	1.0 gal	KT
	Dark Gray	26008	8010-01-397-3810	5.0 gal	KT
	Dark Gray	22516	8010-01-397-3987	1.0 gal	KT
	Light Buff	22516	8010-01-397-3811	5.0 gal	KT
	Light Buff				
	AST MS-10C				
	AST MS-7C				
	AST MS-7CZ				
	Ameron Amercoat 137				
	Type I, Comp G, High Durability, Rollable, General Use Abrasive Deck Coating	36076	8010-01-397-3802	5.0 gal	KT
	AST MS-400G				
	AST MS-440G				
	AST MS-660G UV Resistant Epoxy/Low Solar Absorbing				
	Ameron Amercoat 138HR				
	Type II, Comp G, Standard Durability, Roll or Trowel, General Use Abrasive Deck Coating	36076	8010-01-397-3806	5.0 gal	KT
	AST MS-375G				
	AST MS-440G				
	AST MS-660G UV Resistant Epoxy/Low Solar Absorbing				
	Ameron Amercoat 138HR				
	Type III, Comp G, Standard Durability, Rollable Resilient Abrasive Deck Coating	Dark Gray			
	AST MS-1600 Flexible Epoxy Intermediate Membrane				
	(Use with AST MS-880G or AST MS-660G UV/LSA)				
	Type IV, Comp G, Standard Durability, Sprayable, General Use Abrasive Deck Coating	36076	8010-01-441-5852	5.0 gal	KT
	AST MS-375G				
	AST MS-2000				
	Ameron Amercoat 138HR				
	Color Toppings				
	Dark Gray	36076	8010-01-397-3816	5.0 gal	KT
	Red	31136	8010-01-397-3815	5.0 gal	KT
	White	37875	8010-01-397-3812	5.0 gal	KT
	Yellow	33538	8010-01-397-3814	5.0 gal	KT

	AST MS-180 AST MS-200 Ameron Amercoat 929				
A-A-50598 PHOTOLUMINESCENT MARKING KIT					
	Marking Stencil Set, Surface Ship Kit	-	7520-01-371-0126	-	SE
	Coating Compound Kit	-	8010-01-367-2377	10.0 gal	KT
	Coating Compound Kit	-	8010-01-367-2378	5.0 gal	KT
MIL-C-81309 CORROSION PREVENTIVE COMPOUND, WATER DISPLACING, ULTRA-THIN FILM					
	Type II - Soft Film, Class 1 - Nonpressurized Container	-	8030-00-213-3279	1.0 gal	GL
	Type II - Soft Film, Class 1 - Nonpressurized Container	-	8030-00-262-7358	5.0 gal	CN

F. Procurement Information.

1. Government Services Administration (GSA). The most convenient methods for ordering coatings and supplies through GSA are found in Chapter 4 Painting Organization and Supervision. Following are GSA resources to place orders or get questions answered:
 - a. GSA Customer Service is available at 816-926-7315.
 - b. Access to GSA Advantage! may be obtained at www.gsaadvantage.gov. For questions call the GSA Advantage helpline toll-free at 877-472-3777.
 - c. For up-to-date Multiple Award Schedule information visit the Schedules E-Library at www.fss.gsa.gov. For ordering assistance or for additional information, contact the GSA, Hardware and Appliances Center Customer Service at 816-926-7315.
 - d. Fax or mail a MIPR to the address below for a 48 hour turn around. For questions, call GSA.

General Services Administration
Federal Supply Service (6FEI)
1500 East Bannister Road
Kansas City, MO 64131
816-926-6757 / Fax: 816-926-7971
 - e. To submit a standard MISTRIP requisition, a Form DD 1348-6 may be faxed or mailed to the above address.
2. Vender Information. The following phone numbers are provided for the venders listed in CG Approved Coatings or elsewhere in this manual. The Federal Supply Service (FSS) Multiple Award Schedule contract number is provided where available.

American Safety Technologies
565 Eagle Rock Avenue
Roseland, NJ 07068
973-403-2600 / Fax: 973-403-1108

Ameron Performance Coatings
13010 Morris Road, Suite 400
Alpharetta, GA 30004
501-455-4500 / Fax: 501-455-4069
FSS: GS-10F-8896H expires **31 May 2008**
A. W. Chesterton Company
225 Fallon Road
Stoneham, MA 02180
781-481-2234 / Fax: 781-438-2535

Belzona Inc.
2000 N. W. 88 Court
Miami, FL 33172
305-594-4994 / Fax: 305-599-1140

BLP Mobile Paint Manufacturing Co.
4775 Hamilton Boulevard
Theodore, Alabama 36582
251-443-6110 / Fax: 251-408-0410

Chem Seal Products
11120 Sherman Way
Sun Valley, CA 91352
818-982-1650 / Fax: 818-765-5603

Crawford Laboratories Incorporated
4165 S. Emerald Ave.
Chicago, IL 60609-2646
773-376-7132 / Fax: 773-376-0945

Davlin Coatings, Inc.
700 Allston Way
P.O. Box 2308
Berkeley, CA 94702
510-848-2863 / Fax: 510-848-1464

Dumond Chemicals, Inc.
1501 Broadway
New York, NY 10036
212-869-6350 / Fax: 212-764-5762
FSS: GS-10F-8899H expires 31 May 2003

Enecon Corp.
700 Hicksville Road
Enecon Center Suite 110
Bethpage, NY 11714
516-349-0022 / Fax: 516-349-5522

E Paint Company
25 Research Road
E. Falmouth, MA 02536
508-540-4412 / Fax: 508-495-3210

Esgard, Inc.
515 Debonnaire Road
Scott, LA 70583
337-234-6327

Euronavy Marine & Industrial Maintenance Coatings
P.O. Box 23433
Ft. Lauderdale, FL 33307
954-484-2003/Fax: 954-484-8793
(Euronavy ES301 products are distributed by Sherwin-Williams)

The Flood Company
1212 Barlow Road, P.O. Box 2535
Hudson, OH 44236-0035
330-650-4070 / Fax: 330-650-1453

Hempel Coatings (USA), Inc.
600 Conroe Park North Drive
Conroe, TX 77303
409-523-6000 / Fax: 409-523-6073

International Paint Inc.
Customer Order Service Dept.
6001 Antoine Street
Houston, TX 77091
800-654-7692

ITW Devcon
30 Endicott Street
Danvers, MA 01923
978-777-1100 / Fax: 978-774-0516

ITW Philadelphia Resins
130 Commerce Drive
Montgomeryville, PA 18936
215-855-8450 / Fax: 215-855-4688

Jotun Paints, Inc.
9203 Highway 23
P.O. Box 159
Belle Chasse, LA 70037
504-394-3538 / Fax: 504-394-3726

NCP Coatings, Inc.
225 Fort Street
Niles, MI 49120-0307
616-683-3377 / Fax: 616-683-3305

Sherwin-Williams Company
101 Prospect Ave.
655 Guild Hall
Cleveland, OH 44115
FSS: GS-10F-8004J expires 31 Jan **2008**

Sigma Coatings USA
1500 Harbor Blvd.
Weehawken, NJ 07087
201-866-8400 / Fax: 201-866-7701

Sikkens Wood Finishes
Akzo Nobel Coatings Inc. Customer Service
1845 Maxwell Street
Troy, MI 48084
248-637-0400 / Fax: 248-637-5252

Somay Products, Inc.
4301 N.W. 35th Avenue
Miami, Florida 33142-4382
305-633-6333 / Fax: 305 638-5524

Span-World Dist.
P.O. Box 725
LaPlace, LA 70069-0725
504-651-2911 / Fax: 504-651-2964

Thortex America Inc.
12 Iron Bridge Drive
Collegeville, PA 19426
610-831-0222 / Fax: 610-831-1910

Total Rust & Corrosion Control Inc./**Protective Coatings and Consultants, LLC**
P. O. Box 1707
Ocean Springs, MS 39566-1707
228-217-4707 / Fax: 228-872-2611

Turco Products, Inc.
Subsidiary of Henkel Surface Technologies (800-521-1355)
2700 Temple Avenue, Suite B, Long Beach, CA 90806
562-981-8300 / Fax: 562-981-8303

Ultra Safety Systems
3755 Fiscal Court
Riviera Beach, FL 33404
561-845-1086 / Fax: 561-844-8566

3M Safety Walk General Purpose Slip Resistant Surfacing (Pre-Cut or Rolls), Primer, and Edge Sealer are available from:

Louisiana Association for the Blind
1750 Claiborne Avenue
Shreveport, LA 71103-4189
318-635-6471 / Fax: 318-635-8902

3. Procurement of Miscellaneous Items.

- a. Military/Federal Specifications can be obtained at no charge online from the following DOD web site: <http://astimage.daps.dla.mil/online/>
Registration is required.
- b. FED-STD-595B color samples, fan deck, individual color chips, and sets of color chips are on sale by GSA at the following address:

General Services Administration
Federal Supply Service Bureau
Specification Section
Suite 8100
470 East L'Enfant Plaza, SW
Washington, DC 20407
(202) 755-0325 or 0326

(1) Surface preparation specifications and visual standards are available from:

The Society for Protective Coatings
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4656
412-281-2331 / Fax: 412-281-9992
www.sspc.org

NACE International
P.O. Box 201009
Houston, TX 77216-1009
281-228-6223 / Fax: 281-228-6329
<http://www.nace.org>

- (2) Decals (numerals, letters, and Coast Guard emblems) are still available from UNICOR as listed in contract #DTCG23-96-D-ECV058 although the contract has expired:

UNICOR Federal Prison Industries
3150 Horton Road
Fort Worth, TX 76119
800-827-3168/817-413-3206/817-413-3207
www.unicor.gov

- (3) Decals (numerals, letters, and Coast Guard emblems), controlled substance contraband seizure logos, and photoluminescent materials are available from:

Brace Enterprises
10250 SE 138 Terrace
Dunnellon, FL 34431
352-489-4442 / Fax: 352-489-4476
www.braceenterprise.com

- (4) Photoluminescent materials are available from:

Tidewater Emblems, Ltd.
1816 Potters Road
P.O. Box 3234
Virginia Beach, VA 23454
757-428-1170 / Fax: 757-425-5697